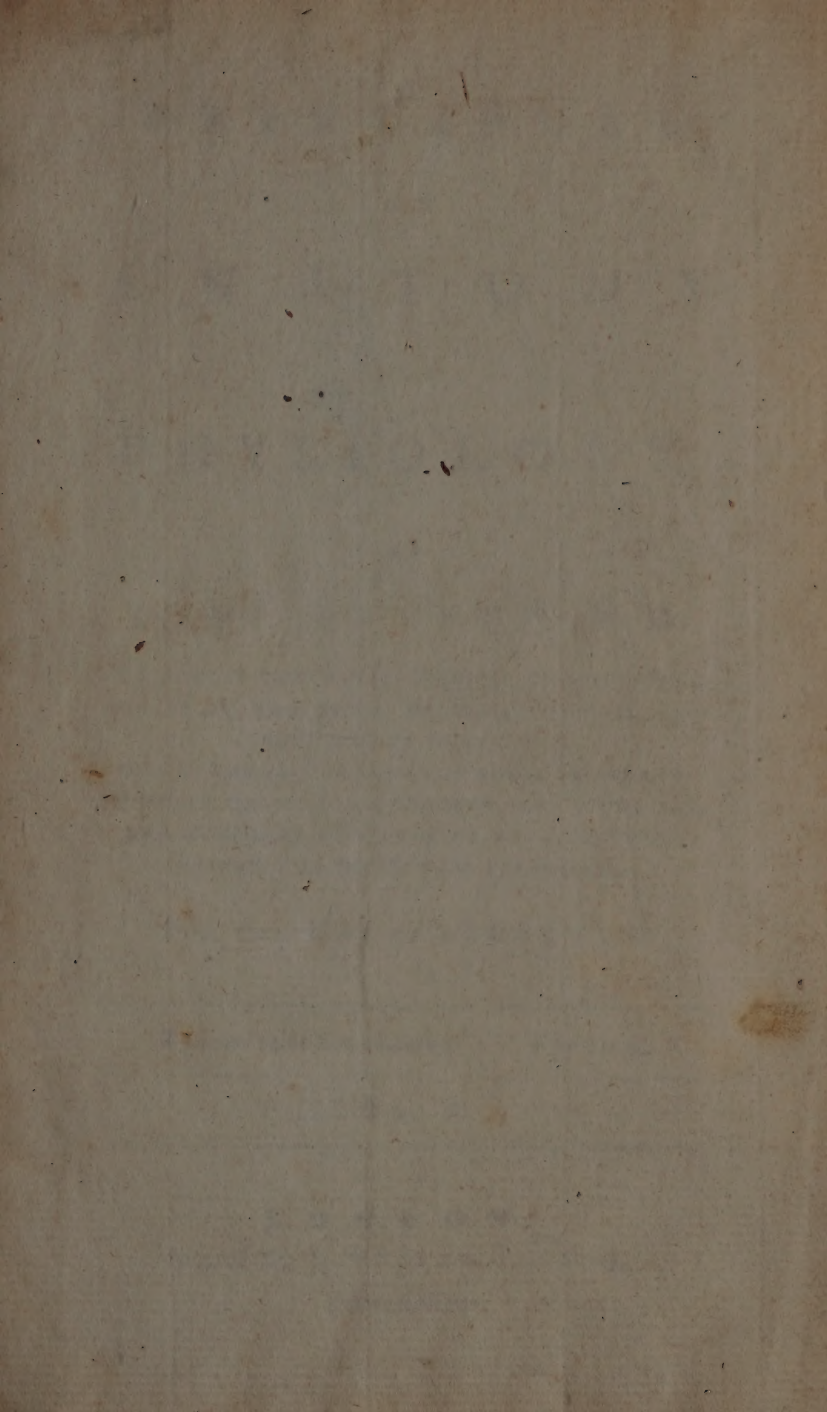




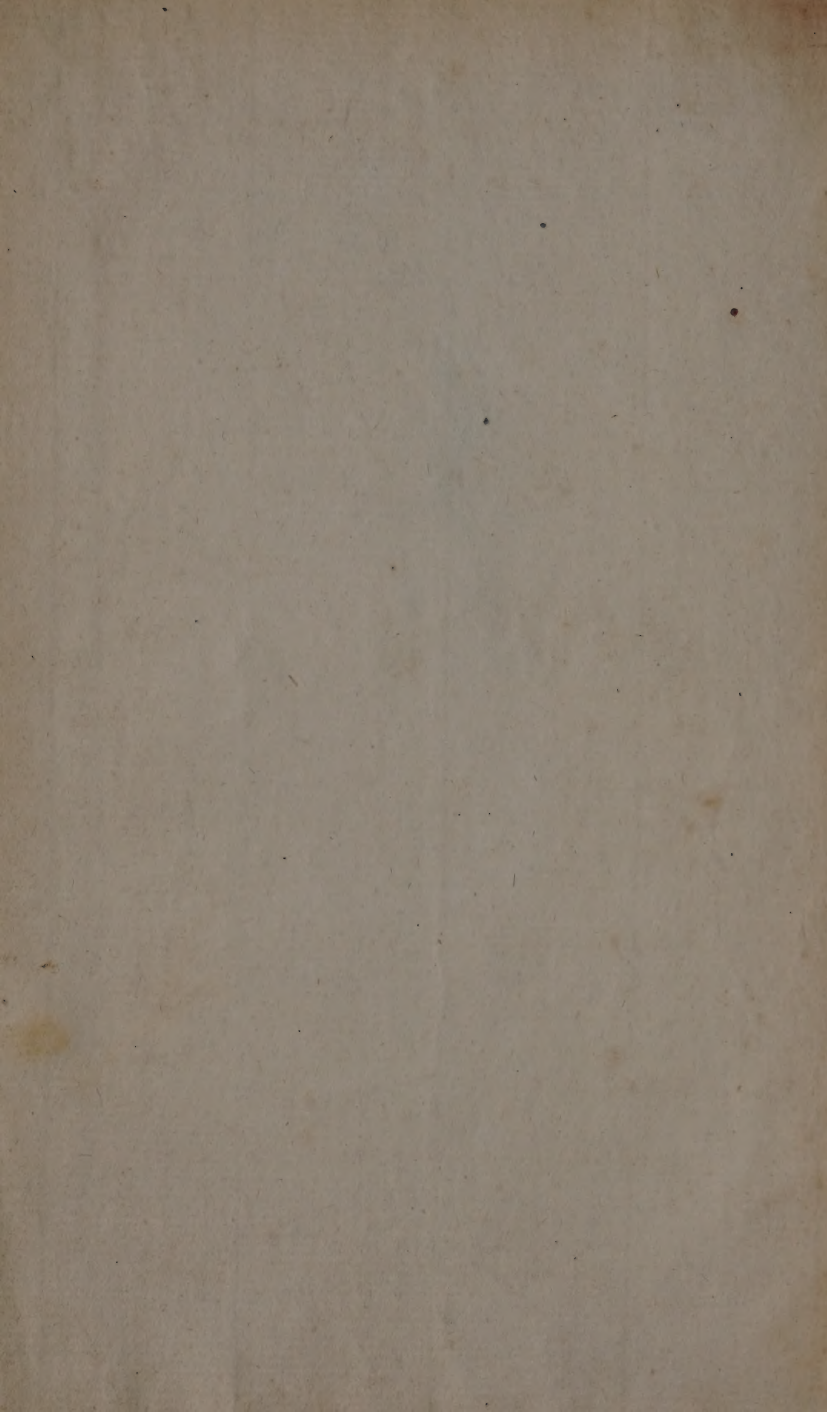
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PRINCIPLES  
OF  
ANATOMY  
AND  
PHYSIOLOGY.

BY  
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OBSTETRICAL SOCIETY OF EDINBURGH.

FOR THE USE OF STUDENTS.

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Who can paint like Nature?

THOMSON.

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VOL. II.

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L O N D O N :

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THE HISTORY OF THE  
ROYAL SOCIETY OF LONDON  
FROM ITS FOUNDATION  
TO THE PRESENT TIME  
BY  
JOHN DE LA BECHE  
F.R.S.

FOR THE USE OF STUDENTS

W. B. E. Smith, Librarian

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ERRATA

## E R R A T A.

Page. 18. line 2. for vertebra read vertebræ. P. 35.  
l. 22. dele at. P. 37. l. 3. for last read former. P. 50.  
l. 7. for lymphatic read lymphatics. P. 53. l. 21. after ca-  
vernous add substance. P. 53. l. 22. for superior read po-  
sterior. P. 54. l. 6. for substances read bodies. P. 77. l. 2.  
for vessels read vesicles. P. 80. l. 6. for are read is. P. 85.  
l. 10. for secloris read sclerotis. P. 101. l. 8. for faucium  
read faucium. P. 120. l. 3. after life add it. P. 127. l. 1.  
for an active matter, read or an active matter. P. 140.  
l. 14. for vis aetrgo read vis a tergo. P. 168. l. 2. from  
the bottom, for mortique read morteque.



# PRINCIPLES OF ANATOMY.

---

## NEUROLOGY.

---

**I**T has already been noticed, that the nervous system consists of

- 1 Sensorium commune,
  - 2 Spinal marrow,
  - 3 Nerves.
- 

### *Sensorium Commune.*

The sensorium commune entirely occupies the cavity of the skull.

This important organ, and all its propagations, are covered by two membranes,

- 1 Dura mater,
- 2 Pia mater.

*Dura Mater.*

The dura mater is a dense double membrane: its external surface adheres closely to the skull, especially to its base; while its internal one, smooth and glistening, only touches the pia mater.

The external lamina that adheres to the skull by numerous small vessels, may be considered as the periosteum of the inner table of the skull.

The internal lamina has processes or duplicatures, by which its extent is encreased.

1 The falx that runs from the bottom of the frontal bone along its spine, and also along the sagittal suture, and superior portion of the vertebral spine of the occipital bone, and widens as it proceeds backwards. It thus forms a partial septum in the course of the long axis of the head.

2 The septum transversum that lies in the course of the lateral spines of the occipital bone, and is of the same breadth with the superior part of the falx that is connected to its upper and middle surface, and gives it the form of an arch, on which account it has been named tentorium.

3 Falx cerebelli, or little falx, that is extended along the inferior portion of the occipital spine, to the margin of the spinal hole.

Besides these processes, there are some others, less considerable, that might be enumerated.

THE ... This

This remarkable membrane contains the following venous cavities, named sinusses, between its laminae :

1 Superior longitudinal sinus, running from before backwards, within the upper and convex edge of the falx.

2 Inferior longitudinal sinus, like an ordinary vein, lying in the inferior margin of the falx.

3 Torcular Herophili, formed in the line of connection of the falx and septum transversum, running backwards.

4 The lateral sinusses (one on each side) contained in the convex margin of the septum transversum, and are a bifurcation of the superior longitudinal one. The torcular falls in with them at their beginning ; they sweep towards the holes common to the occipital and temporal bones, and become internal jugular veins.

5 Cavernous sinusses, situated one on each side of the sella turcica.

Others of inferior note have been described.

The sinusses are part of the venous system ; for all the veins of the sensorium commune open into them in a slanting course, for the most part ; seemingly to prevent somewhat the regurgitation of the blood.

On the external surface, near the longitudinal sinus, are situated glands, perhaps of the conglobate kind. The pits in the skull accommodate them. On the inside, in the



same direction, others are dispersed. The adhesion to the skull and pia mater is always greatest near them.

The anterior arteries are admitted through the orbital fissures; the middle through the spinous holes of the sphenoidal bones (all derived from the external carotids) and the posterior come from the vertebrals. The veins terminate in the sinusses.

As the superior longitudinal sinus may be wounded in trepanning, great caution is requisite in performing this operation in its neighbourhood.

The surgeon ought not unnecessarily to detach the dura mater from the skull, because he lacerates the connecting vessels.

When effusion happens between the skull and dura mater, a perforation of the bone will be sufficient to discharge it; but when it is within it, the membrane must be opened by careful incision.

### *Pia Mater.*

This delicate membrane, which consists of two laminae, immediately invests the sensorium commune.

The external lamina, like that of the dura mater, called tunicia arachnoidea, is simply extended over it; while the internal lamina, strictly named pia mater, sinks into every interstice more or less profoundly.

These

These laminæ are connected to one another by a delicate cellular substance, and in their interstice support innumerable arteries going to, and veins emerging from the sensorium.

It has no connection with the dura mater, except in the vicinity of the sinusses, by means of veins that enter them.

The sensorium commune consists of,

- 1 Cerebrum, or great brain.
- 2 Cerebellum, or little brain.
- 3 Medulla oblongata.

### *Cerebrum.*

The cerebrum is uppermost, and by far the largest portion.

It is divided above by a scissure in which the falx is lodged, into two portions, named hemispheres, which below have each three lobes, anterior, middle, and posterior.

The anterior lobes lie in the anterior, the middle in the middle fossæ of the base of the skull, and the posterior on the tentorium.

The cerebrum is constantly distinguishable by a convoluted surface, resembling the flexions of small intestine, between which a duplicature of the inner lamina of the pia mater sinks to the bottom.

The hemispheres are connected by a white substance, named corpus callosum, seen under the falx, by separating the hemispheres cautiously

tiously, covered by the external lamina of the pia mater, which is consequently lacerated.

Along the corpus callosum, two filaments seem to run from the fore to the hind part, called raphe, or futura, with respect to which the others are transverse.

The convolutions of the adjacent and flat surfaces of the hemispheres overhang the edges of the corpus callosum considerably.

Each hemisphere, from its base, sends a white cord-like production backwards to the medulla oblongata, called peduncle, or crus.

The surface or crust of the cerebrum consists of a greyish lamina or portion, about one eighth of an inch thick, called cortical, or cineritious substance, which seems to be exceedingly vascular.

Within the cortical part is a delicate white fibrous matter, called the medullary or nervous substance, of which the corpus callosum is the continuity between the hemispheres.

Many small blood vessels are every where dispersed in the medullary matter.

When the cortical part is carefully cut off, the medullary substance exhibits a roundish form, upon the whole resembling that of the entire brain, called centrum ovale; but it is to be recollected, that this is shorn of all its processes that enter the convolutions.

The cerebrum contains three cavities, named ventricles, one in each hemisphere, called anterior and lateral, and one between both, at  
their



their bases, commonly named the third ventricle.

The lateral ventricle is a long curved cavity, beginning low in the anterior lobe, turning inwards and upwards; it approaches the corpus callosum, which covers both on the upper part; then it wheels outwards and downwards, sending a cul-de-sac, or processus cæcus into the posterior lobe; and ends in the middle lobe, near its base: its course not a little resembles the curve of a ram's horn.

These lateral ventricles are separated at the superior part by a falx of two laminæ, that depends from the corpus callosum, named septum lucidum, the under edge of which is fixed to the fornix, hereafter described.

These cavities are lined by a delicate membrane, that seems to be the internal lamina of the pia mater.

In the anterior part of the bottom of each, is an oval mass, called corpus striatum; because it contains medullary matter, disposed in striæ.

Behind this, and in the bottom likewise, distinguished by a slight furrow, is a roundish substance, named thalamus nervi optici; because from its under part the corresponding optic nerve arises.

The thalamus of the one side touches that of the other, by a pretty broad and flat surface.

Behind the thalami, and common to both ventricles, are four tubercles; the two anterior,

rior, the largest, have been called nates, the two posterior, testes; over which, in a middle point, is situated the glandula pinealis.

The fornix is an expansion from the inferior edge of the septum lucidum, that lies over the thalami, like an arch, hence the name.

It is connected to the anterior commissure of the hemispheres by two laminae, named anterior pillars, from which it widens in a backward direction, covering a large share of the thalami by its thin edges, which have been called pedes hippocampi, that turn downwards in the course of the ventricles, and are posterior pillars; and hence the whole has been named fornix quadricornis.

The under surface of the expanded portion of the fornix is called psalterium, from its peculiar appearance.

These ventricles communicate with another under the fornix, especially at its anterior part, from which, in each, a loose plexus of vessels, &c. named plexus choroïdes, run backward, connected, notwithstanding, to the fornix and ventricles, so as to cut off the communication considerably, except before, where it remains free, and the two plexus communicate with one another.

The plexus choroidei, which seem to be chiefly venous, are blended behind the fornix with other fine vessels, and cover the tubercula quadrigemina; from these a vein of  
great

great size extends to the beginning of the torcular Herophili, called vena Galeni.

Between the anterior portions of the thalami, and under the hole of communication below the anterior part of the fornix, is the small interstice, called third ventricle; from the bottom of which a contraction, under the name of infundibulum, extends to a round mass in the sella turcica, glandula pituitaria: from its hind and upper part another passage extends back to the fourth ventricle, under the tubercula quadrigemina, called the aqueduct of Sylvius, and iter a tertio ad quartum ventriculum, which contains valvula magna cerebri.

### *Cerebellum.*

The cerebellum lies below the tentorium and posterior lobes of the cerebrum; like the cerebrum it is divided by a scissure into two lobes, that receives the falx cerebelli. The lobes are lodged in the posterior fossæ of the base of the skull.

Between these lobes is a small one, called protuberantia vermiformis; in some measure it serves to connect them, and is perfectly similar to them in structure.

The surface of the cerebellum is formed of concentric arches, or portions of curves, in general disposed from before, backwards; the interstices are very deep, concealing many

subordinate arches, and numerous furrows, in the lateral surfaces of the arches; into all which the inner lamina of the pia mater, and many very fine vessels enter.

The cortical substance is wonderfully extended, in consequence of the arched eminences and their lateral furrows. The medullary matter is connected with it in such sort, that a small process of it is in the middle of every eminence.

The processes are all collected, and form a large mass towards the anterior and inferior part; with respect to which, the processes, in a certain point of view, are like ramifications, and the whole, therefore, named *arbor vitæ*.

The trunk of the medullary substance is divided into four portions, called *crura*, disposed as will be described.

### *Medulla Oblongata.*

This is the smallest division of the sensorium, and lies in the middle of its base, from the fella turcica to the occipital hole, along the cuneiform process.

When viewed in the inverted position, from before, it much resembles the scrotum and penis, also inverted.

Its surface is uniformly fibrous and medullary.

The part that resembles the scrotum is foremost, and is called *tuber annulare*, and

*pons*



pons Varolii, because of its form, and the crura cerebri passing within it, like two rivers under a bridge.

This tuber annulare is formed by the two anterior crura cerebelli, that meet on its under part in a line or suture that may be compared to the raphe scroti.

Behind the pons Varolii the medulla oblongata is contracted, and, in the occipital hole, becomes spinal marrow; this may be called cauda medullæ oblongatæ, and resembles the penis.

On the sides of the cauda are two eminences; below and between these are two others; the former are named corpora olivaria, the latter pyramidalia; chiefly produced by the posterior crura cerebelli.

Between the upper surface of the cauda, in the interstice between the four crura and the protuberantia vermiciformis, is a cavity, named fourth ventricle, that communicates before with the aqueduct of Sylvius; in which is situated a medullary production, called valvula magna cerebri, and valvula Vieussenii; the posterior extremity, that resembles a pen, and named calamus scriptorius, is shut by the pia mater.

*Spinal Marrow.*

The medulla spinalis is a continuation of the cauda medullæ oblongatæ, lodged in the spinal canal.

This important substance is of a roundish form, extends from the occipital hole of the skull, to the extremity of the os sacrum, and is covered by the dura and pia matres, disposed as within the skull.

On each side, corresponding to the intervertebral holes, is a sulcus of considerable depth.

The exterior part is medullary, and the internal cineritious; in this respect similar to the medulla oblongata.

Nearly opposite to the second lumbar vertebra, the spinal marrow becomes a great bundle of nerves, under the name of cauda equina.

The fluids may be extravasated within the theca of the dura mater, covering the spinal marrow, and give compression and its consequences, which may be removed by trepanning, as mentioned in the Osteology.

Fragments of the vertebræ may likewise give compression, and may require a similar treatment.

*Nerves.*

These (nervi) are forty pairs of medullary cords, that arise from the sensorium commune  
and

and medulla spinalis; of which ten are commonly reckoned to proceed from the former, called cerebral nerves; and thirty from the latter, named spinal nerves.

Each nerve consists, for the most part, of numerous fibrills, severally invested by the pia mater, and jointly by the inner lamina of the dura mater.

In some points the nerves become enlarged, in various degree, somewhat like tumours; these are called ganglia: their structure is not rightly known.

The nervous cords often unite, and cross their constituent fibres variously; producing those arrangements, called plexus; some of which are very large and remarkable.

### *Cerebral Nerves.*

The first, or olfactory pair (nervi olfactorii) arise from the inferior parts of the anterior lobes of the cerebrum, near the roots of the corpora striata, and are extended forward to the holes of the ethmoid bone; by which their delicate fibrills descend to the nose, to become the organ of smelling.

The trunks of these nerves, for which there are particular grooves formed in the anterior lobes of the cerebrum, from comparison to those of brutes, have been called processus mamillares.

The

The second, or optic pair (*nervi optici*) spring from the thalami, and incline to one another before the sella turcica, where they are closely united; from this they diverge to their proper holes, to reach the bottoms of the orbits and posterior surface of the eye-balls, which they enter, and become retinae, or the organs of seeing.

The third pair (*nervi oculorum motorii*) take their rise from the crura cerebri, near the pons Varolii, and proceed to the orbits, through the cavernous sinusses and superior orbital fissures, to the muscles of the eye-balls, particularly the recti: hence the name.

The fourth pair (*trochleatores*) arise from the roots of the tubercula quadrigemina, and enter the cavernous sinusses, through small holes in the beginnings of the edges of the tentorium, to reach the orbits and the trochleares muscles of the eye-balls, on which they are entirely bestowed: hence the name.

The fifth pair (*nervi trigemini*) are derived from the crura cerebelli, immediately behind the pons Varolii, and enter the cavernous sinusses, where each having formed a ganglion, is divided into three branches: hence the name.

The first, or ophthalmic branch, goes to the orbit, and gives the frontal, lachrymal, and nasal nerves.

The second, or superior maxillary branch, passes from the cavernous sinus through its proper



proper hole, and is divided into three; sphenopalatine, posterior alveolar, and infra-orbital nerves.

The sixth pair (*nervi adducentes*) arise between the corpora pyramidalia and pons Varolii, and enter the cavernous sinus by holes in the dura mater, behind the sella turcica, where a small branch from each is supposed to go out by the carotid holes, to become intercostal nerves; they then reach the adductores muscles of the eye-balls: hence the name.

The seventh, or auditory pair (*nervi acustici*) is in fact a double pair; for on each side is a *portio mollis* that goes to the tympanum, &c. and becomes an organ of hearing; and a *portio dura*, that passes out by the aqueduct of Fallopius, and in its passage gives off a small branch to the tympanum, named *chorda tympani*, while the trunk under the parotid gland is extensively ramified to the face, temples, &c. hence compared to the *pes anserina*.

The eighth pair (*par vagum*) arise from the sides of the corpora olivaria in disgregated fibrills; and, before they issue from the skull, each is joined by a branch, ascending from the fifth or sixth spinal nerves (*nervi accessorii Willissii*) which soon separate, and are lost in the sterno-cleido-mastoidei, and cucullares muscles.

This pair, descending by the holes common to it and the internal jugular vein, gives off branches to the tongue, &c.

The

The trunks run down the sides of the neck, between the common carotids and internal jugulars, and enter the thorax; from which a considerable branch on each side is reflected to the larynx, under the name of recurrent nerves.

Branches from this eighth pair are joined by others from the intercostals, &c. and form the cardiac, two pulmonary, oesophageal plexus, &c.

The trunks descend along the oesophagus, the right one behind, and the left one before it, and these reach the abdomen through the cardiac orifice of the diaphragm, and, together with the intercostals, produce the two gastric, the hepatic, the splenic, and two renal plexus.

The ninth, or lingual pair (*nervi linguales*) spring from the inferior part of the corpora pyramidalia, and go out by their proper holes in the occipital bone; after communicating with the eighth pair, and first cervicals, they are transmitted to the tongue, between the internal jugular veins and carotid arteries respectively.

The tenth pair, by some reckoned along with the spinal nerves, arise from the sides of the medulla oblongata, and go out between the occipital bone and first vertebra, to the sides of the neck.

*The Spinal Nerves.*

Each spinal nerve is made up of fibrils that arise on each side of the longitudinal corresponding sulcus in the spinal marrow; these run towards one another, and pass jointly through the vertebral holes.

The spinal nerves, arranged in pairs, are, like the vertebræ, distinguished into

Seven cervical,  
Twelve dorsal,  
Five lumbar,  
Six sacral.

The first cervical pair are transmitted through the holes between the first and second vertebræ; some of the branches, joining with those of the tenth cerebral, intercostals, and second cervical, supply the flexor muscles of the head principally.

The second cervical pair pass between the second and third vertebræ, and communicate with the adjacent nerves, and are distributed chiefly to the platysmata myoidea.

The third cervical pair, after going out between the third and fourth vertebræ, are connected with the second and fourth, and they produce the phrenic nerves, that pass into the chest, between the subclavian arteries and veins, and run along each side of the pericardium to the diaphragm.

The fourth cervical pair go out between the fourth and fifth vertebra, after giving off small branches, they run downwards, between the *scaleni anticus* and *medius*, to the brachial or axillary plexus.

The fifth cervical pair are transmitted between the fifth and sixth vertebræ, in the interstice of the *scaleni* muscles, to the brachial plexus.

The sixth cervical pair go out between the sixth and seventh vertebræ, and, in the interstice of the *scaleni* muscles, to the brachial plexus.

The seventh cervical pair are transmitted betwixt the last cervical and the first dorsal vertebræ, to the axillary plexus.

The first dorsal pair go also to the axillary plexus.

The axillary plexus, produced by the intermixture of the specified nerves, has a peculiar meshy disposition, and through one of its holes transmits the axillary artery. It sends off the following principal branches to the superior extremity :

1 *Nervus cutaneus* ; this runs down, not far from the artery, and is distributed to the integuments of the internal part of the fore-arm and palm :

2 *Nervus musculo-cutaneus*, or *perforans Cafferii*, that passes through a hole in the *coraco-brachialis* muscle, and is distributed to the *biceps flexor cubiti*, *brachialis internus* muscles,  
and



and the integuments of the external part of the fore-arm and hand :

3 Nervus muscularis, that passes between the os humeri and muscles, in an outward direction, to the extensor muscles of the arm and hand, and reaches the back of the hand near the thumb :

4 Nervus ulnaris; this runs down the inside of the arm to the hollow between the internal condyle of the os humeri and olecranon, and then principally follows the course of the ulna, to the wrist, where a branch is sent backwards. The trunk passes by the edge of the os pisiforme, within the ligamentum carpi arterius, to the palm, and gives two branches to the little finger, and one to the contiguous side of the ring finger: these run along the sheaths of the tendons to their points :

5 Nervus radialis, which lies near the humeral and radial arteries ; at the wrist it sends a branch backwards, and then proceeds within the ligamentum carpi arterius to the palm, where it gives two branches to the thumb, fore-finger, and middle finger, and one to the ring-finger, that run along the sheaths of the tendons like those of the ulnar nerve :

6 Nervus articularis, that passes under the head of the os humeri to the muscles adjacent :

7 Nervus scapularis, which, through the notch in the superior costa of the scapula, is distributed to the muscles on the scapula.

The remaining eleven dorsal pairs principally run forward in the interstices of the ribs, under the name of intercostals.

The first, second, third, and fourth lumbar pairs, after giving branches to the psoas and other muscles, form a plexus that may be called lumbar; from which go off,

1 Nervus cruralis anterior, that lies on the psoas muscle, and runs to the leg along with the iliac vessels, in the interstice of the psoas and iliacus internus muscles, and behind Pau-part's ligament; it immediately distributes large and numerous branches to the extensor muscles, on the fore part of the thigh; one runs down in the course of the femoral artery; and another follows the vena saphena to the upper surface of the foot.

2 Nervus cruralis medius vel obturatorius, which runs between the iliac vessels and brim of the pelvis, and passes through the deficiency of the obturator ligament, along with an artery of that name, to the adductor and other muscles, on the inside of the thigh.

The fifth lumbar nerve joins with the sacral nerves, and make a plexus that may be called sacral; from which are derived

3 Nervus ischiaticus vel cruralis posterior, that, after a short lateral course between the pyriformis muscle and sacro-ischiatic ligaments, is situated between the os ischium and trochanter major, upon the gemini and quadratus muscles.

This,

This, the largest nerve, runs down the posterior part of the thigh to the ham, where it touches the vessels, and is *nervus poplitæus*: in this course it gives off branches, and particularly a large one, forwards, over the head of the fibula, to the muscles in the interstice of the bones of the leg, that extends to the superior part of the foot; and one that runs down along the surface of the *gastrocnemius*, to the foot.

The trunk passes between the heads of the *gastrocnemius* muscle, and follows the *arteria tibialis postica* to the sole, by the hollow below the inner ankle; and is divided into the external and internal plantar nerves that are distributed to the toes, nearly as the ulnar and radial nerves are to the fingers.

4 *Nervus pudicus*, that runs with the correspondent vessels to the pudenda, under the arch of the pubes.

Small branches go to the rectum, bladder, &c. from the inferior sacral nerves.

Through the posterior holes of the *os sacrum* branches are transmitted to the adjacent parts.

The great intercostal nerves are a common production from all the spinal ones at least; and, on account of the great sympathy of parts these produce, they have been called the great sympathetic nerves by Winslow.

It has been mentioned, that on each side through the carotid hole a branch descends from the sixth pair; also a small one from the second of the fifth pair: these, united, run down  
between

between the bodies and transverse processes of the vertebræ, along the neck, to the thorax, and receive the branches from the cervical nerves, and form three anterior ganglions, called cervical.

The uppermost ganglion, of an oblong form, is opposite to the second vertebra; the middle one lies before the fifth vertebra; and the undermost on the side of the last one, behind the subclavian artery, from which, joined with fibrils from the eighth pair, branches descend to form the cardiac plexus.

The intercostals descend between the pleuræ and vertebræ, receiving branches at every vertebral interstice; at which, likewise, ganglions, that may be called lateral, are formed.

At the diaphragm the intercostals join, and produce the nervus intestinalis, or splanchnicus, bestowed on the viscera.

The trunks again separate from one another, and each produces a ganglion by the side of the aorta, called semilunar ganglions; from which branches are propagated that form the solar plexus.

From the semilunar ganglions and solar plexus, branches run variously to form the following plexus:

1 The cœliac. 2 The hepatic. 3 The splenic. 4 The superior mesenteric. 5 The renal. 6 The inferior mesenteric. 7 The mesocolic. 8 The hypogastric. 9 The spermatic.

## SPLANCH-



## SPLANCHNOLOGY.

---

**S**PLANCHNOLOGY, in a strict acceptation, treats of the viscera ; but in a more extensive one, of other parts, such as the eyeball, membranes, &c.

### *Abdomen.*

The osseous and muscular containing parts of the lower belly have been described in the Osteology and Myology ; within these is another, called

### *Peritoneum.*

This is an extensive membrane of one lamina : its external surface is attached to the muscles, &c. by cellular substance ; while its internal one is smooth and glistening, like that of the dura mater.

The space comprehended within this membrane is peritonæal cavity (*cavum peritonæi*) and in the healthful state is possessed only by the halitus, or lymphatic exudation, that takes place from the surfaces of all membranes, especially those that have cavities.

This

This cavity is the seat of ascites, and some other effusions.

The peritonæum has many inward processes of various form and extent, in which the greatest part of the viscera are lodged, &c. so that these are in fact on the outside of this membrane, deriving from it, however, their peritonæal coat, which, in most instances, has the effect of a ligament.

The peritonæum passes smoothly along the umbilical and inguinal rings; by which it happens, that when any viscera is protruded so as to form hernia, the peritonæum is pushed along, and becomes the sac.

The abdominal containing parts may be arranged under the following heads:

**I. Intestinal, or digestive;**

- 1 The intestine,
- 2 The mesentery,
- 3 The omentum.

**II. Biliary;**

- 1 The liver,
- 2 The spleen,
- 3 The pancreas.

**III. Urinary;**

- 1 The kidneys,
- 2 The renal capsules,
- 3 The ureters,
- 4 The bladder.

**IV. Genital organs.**

The

The intestine is a tube of various capacity, of great length, and artfully convoluted, so as to occupy the greatest share of the abdominal space.

It consists of

- 1 Stomach,
- 2 Intestine, strictly so called.

### *The Stomach.*

This (ventriculus) is a capacious bag, that occupies the upper part of the abdomen.

Its great extremity lies in the left hypochondrium, while its small one is somewhat lodged in the right.

This organ has two orifices, one named cardiac (cardia) that joins with the œsophagus, immediately under the diaphragm, and through its cardiac opening, and opposite to the spine; so that the great extremity projects considerably beyond it. The other, called pyloric (pylorus) two or three inches to the right of the other, and somewhat lower, is connected to the intestine.

The posterior surface, or edge of the stomach, between the orifices, exhibits a great notch, that is called the little arch or curvature; while the opposite part, convex and more extensive, is named its great arch or curvature.

Large branches of vessels, called coronary, sweep along or near these arches, sending out

many anastomosing ramifications to every part of the stomach.

The arteries are derived from the middle or gastric branch of the cœliac.

The structure of the stomach, upon the whole, is the same with that of the œsophagus and intestine.

### *The Intestine.*

The intestine, or alimentary canal, extended from the pylorus to the anus or perinæum, is divided by anatomists into

- 1 Small (intestina tenuia)
- 2 Great (intestina crassa).

The small intestine, less capacious than the other, is subdivided into

- 1 Duodenum,
- 2 Jejunum,
- 3 Ilium.

The first begins at the pylorus, and is reckoned to be twelve fingers breadth, of the subject to which it belongs, in length. It stretches in a curved manner across the spine, to the left, and is joined to the second, of uncertain length; and this to the third, that ends, after it and the second have formed numerous convolutions, opposite to the right fossa iliaca, or near the right haunch.

The pylorus is a contraction, somewhat like a ring or anus, and at same time prevents



vents the contents of the stomach to pass off too readily, and *vice versa*.

The duodenum has a hole in its upper edge to receive the gall and pancreatic ducts; and is not invested with the peritonæum in the same way as the others.

The surface, called interior, which is in fact exterior, is spread over with numerous membranous doublings, called *valvulæ conniventes*.

The great intestine is likewise subdivided into

- 1 Cæcum,
- 2 Colon,
- 3 Rectum.

The cæcum is very short, and lies in the right iliac fossa, and is a cul-de sac, partially covered by the peritonæum; it touches the iliacus internus muscle with the interposition of cellular substance.

It has been proposed to open it by incision without wounding the peritonæum, with a view to extract indurations that sometimes are formed there \*: a speculative operation, comprehended under enterotomy.

A little process, called *vermiformis*, from resemblance to the earth-worm, hangs down

\* I have specimens of such indurations: they seem to consist principally of the feculent part of the ingesta.--- One was very large, and was supposed, by some who examined the patient while alive, to be an extra-uterine fœtus.

from the cœcum ; it exactly possesses the intestinal structure.

The colon is the most extensive. It begins from the cœcum ; the two are distinguished by the insertion of the ilium, or end of the small intestine, which projects a little into their cavity under the name of *valvula coli* : it ought rather to be called *valvula ilii*. It somewhat resembles the pylorus, and prevents regurgitation.

The colon extends upwards to the liver, and then sweeps to the left side, a little above the umbilicus, forming the arch of the colon, that in some respects is a transverse partition of the abdominal cavity. It nearly touches the spleen, and descends towards the left fossa iliaca, where it forms a double curvature, near the brim of the pelvis, called sigmoid flexure, and, at the top of the os sacrum, ends in the rectum.

Three longitudinal bands or strips can be traced along the colon, under the name of ligaments ; they collect it into bosses or cells, called *cellulæ coli*.

The rectum lies on the anterior face or concavity of the os sacrum, and terminates by a valve-like orifice, about an inch before the os coccygis, under the name of anus.

The rectum is only partially covered by the peritonæum ; for the posterior part of it, by the intervention of cellular substance, adheres to the periosteum of the os sacrum.

The

The whole of the œsophagus, as well as intestine, are formed of a tubular inflection of the integuments, beginning from the mouth, and ending in the common surface at the anus; by this means the cuticula immediately bounds the cavity, and has been called villous coat (*tunica villosa*); the cutis vera invests it under the name of nervous coat (*tunica nervea*). The *valvulae conniventes* are principally formed by doublings of these coats.

A muscle that has been called muscular coat incloses these membranes, and completes the intestine.

The intestinal muscle consists of two layers of fibres, the one longitudinal, the other transverse, more or less, which are capable to narrow the tube, by partial and successive action, called vermicular and peristaltic motion, to propel the contents downwards.

The intestine has its arteries from the superior and inferior mesenteric trunks, and returns the corresponding veins to a great common trunk that ends in the sinus of the liver; on this account called *vena portarum*, and abdominal, to distinguish it from the part of this vessel within the liver, named hepatic.

The intestinal nerves are derived from the adjacent plexus.

The cuticular surface of the intestine abounds variously with glands or follicles of the mucous kind, which produce the lubricating and protecting fluids with which it is done over.

over. In the stomach they secrete what is commonly named gastric fluid, which by no means is so abundant as has been supposed.

From the cuticular surface numerous absorbent vessels arise under the name of lacteals (*vasa lactea*) from the accidental circumstance of their being ofteneft seen full of chyle, a milk like fluid. They are, in fact, in no respect different from the absorbents, commonly called lymphatics, and will be afterwards described.

### *The Mesenery.*

The mesentery (*mesenterium*) a doubling of the peritonæum, is one of its largest processes.

It arises somewhat obliquely from its posterior surface, opposite to the uppermost lumbar vertebra.

It is of various breadth, and the edge is artfully rumpled so as suddenly to acquire extent equal to the length of the intestine.

Its intestinal edge, which covers the whole of the intestine, with the exceptions formerly mentioned, under the name of outer, or peritonæal coat, begins at the left extremity of the duodenum, and invests the jejunum and ilium; and at the cœcum it becomes narrow, and may be said to end.

Towards the liver, where it is connected to the colon, it begins to widen, and has been called



called right ligament of the colon; from which it extends to the left, and its greatest breadth corresponds to the arch of the colon, and principally forms the transverse partition; already mentioned: in the left hypochondrium it again becomes narrow, and is named left ligament of the colon: it widens at the sigmoid flexure, and finally terminates at the upper part of the rectum.

As far as the mesentery is connected with the colon and rectum, it is commonly called mesocolon, and mesorectum.

The edge of the mesentery, which, like a sling, invests the intestine, and limits its locomotion in the stile of a general ligament, exhibits a curvature somewhat like a scroll.

The interstice of the mesenteric laminae contains the ramifications of the inferior mesenteric artery, beautifully arched, and anastomosing, going to the small intestine; and that of the mesocolon, the superior one principally, going to the great intestine, as well as the corresponding veins, combining to form the trunk of the vena portarum abdominalis.

This interstice also supports the intestinal nerves, extending from the plexus to the intestine, and the lacteal vessels, running towards the spine, and their conglobate glands, under the name of mesenteric glands.

*The Omentum.*

This membrano-adipose substance principally hangs down from the great curvature of the stomach, and arch of the colon; and accordingly this portion of it is called great omentum, to distinguish it from a less portion that fills up the space between the small curvature of the stomach, liver, &c. under the name of small omentum.

On the right side the great omentum is connected to the biliary ducts, between the liver and colon; on the left, to the spleen; and between these points to the stomach and colon, as described.

The pendulous part is of various extent, commonly sufficient to cover the convolutions of the small intestine.

It is in a great measure a production of the peritonæum, being obviously continued from the peritonæal coats of the stomach and colon; so, however, as to form a great cavity or bag.

This omental cavity is principally between the inferior surface of the stomach and the superior surface of the mesocolon, and communicates with the peritonæal cavity by a hole sufficient to admit the finger, immediately behind the biliary ducts, called most properly foramen Winslowii; because Winslow, a most eminent anatomist, first described it, together with the real structure of the omentum.

Upon

Along the pendulous omentum, by some called gastro-colic portion, vessels of considerable size are disposed, principally from the inferior coronary artery, that are capable to give considerable hæmorrhage; therefore the surgeon ought to act cautiously when he is treating hernia, in which it is often included.

Upon the sigmoid flexure of the colon, and upper part of the rectum, are fatty flaps or processes, very much of the omental structure, and therefore named appendices epiploicæ.

### *The Liver.*

This (hepar) is a large glandular mass, lying principally in the right hypochondrium.

Its form is suited to its situation; for its upper surface is convex, agreeably to the concavity of the diaphragm; while its under surface is concave, correspondent to the convexity of the stomach.

The posterior edge is thick, and has an excavation opposite to the spine; the anterior one is curved, agreeing mostly with the line formed by the cartilaginous extremities of the ribs.

The liver is closely fixed to the diaphragm by the excavation; and also to the vena cava by large veins, called hepatic, to be afterwards described.

Besides this adhesion the liver is variously connected to the adjacent parts by doublings

of the peritonæum (which invests the whole of it except the excavation) under the name of ligaments.

There is a broad doubling that connects its convex surface to the abdominal muscles, nearly in the direction of the linea alba, and to the diaphragm, called suspensory ligament; its anterior edge, that extends towards the umbilicus, includes a cord-like substance that in the foetus was umbilical vein: this is continued through a notch in the anterior edge to the concave surface of the liver.

This ligament is the limit of what are called the lobes of the liver; for all to the right of it is called the great lobe, and to the left of it the small lobe; consequently it will be understood that the left lobe extends somewhat into the left hypochondrium, and that the thin edge may be felt, by careful pressure of the fingers, near the sternum.

Two small doublings of the peritonæum tie these lobes to the diaphragm respectively, and are called right and left ligaments of the liver.

In the concave surface, beginning in the great, and extending to the small lobe, and nearest the posterior edge, is a scissure, commonly called sinus of the liver.

From the notch at the suspensory ligament, there is a hole or canal that reaches to this sinus, which allowed the umbilical vein also to reach it.

Between



Between the sinus and the posterior edge is a process, called lobulus Spegellii; and opposite to this, on the other side, is almost a similar one, called lobulus anonymus.

On the right side of the lobulus Spegellii is a channel leading backward from the sinus, that in the foetus lodged the canalis venosus.

The sinus of the liver, thus surrounded with eminences, has been compared to portæ, or gates, and hence named sinus portarum, by the ancients; and the intestinal vein that enters the liver through it has been also called vena portarum.

The liver is made up of a vast multitude of follicles and their blood and excreting vessels, for the purpose of preparing the bile or gall.

The vena portarum, as it approaches the sinus, divides into two branches; these run, the one to the right, the other to the left lobe, disappearing in the extremities of the sinus, and are gradually subdivided into minute ramifications that perhaps constitute at and enter the follicles, conveying to them the blood from which the bile is secreted; a function performed to all other glands by arteries.

The extremities of these veins are reflected so as to return the blood from the follicles, and, gradually uniting, form the hepatic veins formerly mentioned, generally three in number, that go out of the liver by the evacuation in its posterior edge, to join the vena cava inferior as it passes through the dia-

phragm; and consequently near the right auricle of the heart, where it ends.

From each follicle an excreting duct is produced. The gradual adunation of these numerous ducts, called commonly *pori biliarii*, forms two large ones, that become apparent in the extremities of the sinus, and soon unite into the hepatic duct, which tends downwards.

The hepatic duct, about two inches from the sinus, is connected with another duct; between the two is an acute angle.

This duct leads back to an oval cyst of considerable size, adhering to the concave surface of the great lobe, and partly lodged in a particular excavation or fossa, so disposed that its fundus is turned forwards, and a little downwards, and generally projects somewhat beyond the thin edge. It is called gall-bladder (*vesicula fellea*); because it is found more or less filled with gall; and its duct that joins the hepatic one, as mentioned, is named cystic duct.

Where the cystic duct joins with the bladder there is a particular curvature, which may produce, in some degree, the effect of a valve, so as to prevent the too ready transmission of the bile.

The gall-bladder consists of two complete coats and a partial one, the latter derived from that of the liver, and consequently from the peritonæum, may therefore be called peritonæal; the

the others are continuations of those of the intestine; and therefore may be called cuticular and cutaneous; the last, immediately forming the cavity, has been observed to abound with rugæ somewhat in the stile of lozenges\*.

The trunk constituted by the union of the hepatic and cystic ducts, under the name of ductus commune cholidochus, reaches the upper surface of the curvature of the duodenum, about four inches from the pylorus, which it pervades slantingly; and its orifice is surrounded by the valvulæ conniventes, artfully disposed as if to protect it.

It thus appears, that all the gall produced in the follicles is directly conveyed to the duodenum, except that which, by regurgitation through the cystic duct, reaches the gall-bladder; between which and the pori biliarii there does not seem to be any other connection.

A considerable artery, named hepatic, derived from the cœliac one, enters the sinus of the liver, previously divided into two or three branches, and is minutely dispersed.

The hepatic artery, it would seem, carries blood for the nutrition of the liver, which falls into the hepatic veins.

A production from the peritonæum runs into the sinus of the liver, and invests its vessels, under the name of capsula Glissonii.

\* See an elaborate Treatise de Hepate, &c. by Dr. F. A. WALTER, of Berlin, my ingenious friend, who seems to have bestowed immense attention on his subject.

Numerous lymphatic vessels originate in the liver; those on the convexity tend upwards, through the diaphragm to the thorax; those on its concavity fall into the thoracic duct, below the diaphragm \*.

### *The Spleen.*

This (lien) is of an oval form, of considerable thickness, and various magnitude. It is situated longitudinally between the great extremity of the stomach and the diaphragm; and accordingly the surface that respects the latter is convex, and the former concave.

In the concave surface is a longitudinal sinus, or scissure, a good deal resembling that of the liver; which likewise serves for the transmission of vessels.

The substance of the spleen is spongy and lax, and, according to some anatomists, cellular. It is covered by a coat derived from the peritonæum.

The left branch of the cœliac artery, in a winding course above the pancreas, and behind the stomach, enters its sinus, and is minutely dispersed, under the name of splenic artery.

Veins emerge from the splenic sinus and communicate with those of the stomach, under the name of *vasa brevia*, and the whole

\* See an ingenious Anatomical Fasciculus, by WERNER and FELLER.



finally terminate in the vena portarum, near its trunk.

The spleen has its nerves from the splenic plexus, and sends its lymphatics towards the bottom of the thoracic duct.

It seems highly probable that this glandular-like mass serves to prepare a quantity of blood, not intestinal, by retardation especially, to be sent to the liver along with the intestinal blood, to favour the more perfect secretion of the bile, and of consequence is properly classed as a biliary organ.

### *The Pancreas.*

The pancreas is a glandular mass, resembling a dog's tongue, of which the thick extremity is attached to the curvature of the duodenum, near the pylorus, and the small one to the spleen; of consequence it is situated transversely in the posterior part of the omental cavity, so that its anterior surface makes a part of the boundary of it.

A small process from its thick extremity runs somewhat along the curvature of the duodenum, and is called little pancreas (*pancreas parvum*).

The pancreas is a collection of small glands, which much resemble the salivary ones; from each of which an excreting duct is produced that runs to a common longitudinal trunk in the middle, gradually enlarges as it approaches

proaches to the duodenum, a good deal like a feather, where it receives the common duct of the little pancreas, and then enters the duodenum, along with or very near the biliary duct.

Its arteries are derived from the coeliac and superior mesenteric arteries; and its veins are remitted to the splenic and mesenteric branches.

This large gland is unquestionably subsidiary to the salivary ones, and immediately serves to dilute the bile upon its effusion into the intestine.

May not indurations of this gland, by affecting the biliary ducts, give jaundice?

### *The Kidnies.*

These (renes) are two oval glands, situated in the posterior part of the abdominal cavity, one on each side of the spine, and destined to secrete the urine.

The left one touches the spleen by its superior extremity, as does the right the liver; but as the liver is larger than the spleen, it occupies space in proportion, and of consequence the right kidney is a little lower than the left one.

In the edge that is turned to the spine the kidney has a sinus or scissure, like those of the liver and spleen, and answering the same purpose, viz. the transmission of vessels: the opposite edge is regularly curved.

Although

Although the surface of the kidney is slightly lobular in the foetus, yet in the adult it is smooth, and is covered by its tunica propria.

The following structure is discovered by incision, injection, &c.

The exterior part of its substance, called cortical, because it surrounds all the other parts, seems to be glandular.

Within the cortical part, and originating from it, are collections of tubes (*tubuli uriniferi Belliniani*) running inwards, like pencils, to form papillæ or little eminences, about fourteen in number.

In the interstices of the tubular collections the cortical part is somewhat elongated, so as to be of unequal thickness.

Each papilla, at a small distance from its point, is surrounded with a tubular membrane, named *infundibulum*, which, at the point of the papilla, becomes narrow.

The number of *infundibula* equals the number of papillæ. Beyond their contractions, towards the interior edge of the kidney; they all unite, and form a common cavity, called *pelvis* of the kidney; which chiefly lies in the sinus, and being contracted becomes *ureter*.

It thus appears, that every particle of fluid transmitted by the uriniferous tubes must fall into an *infundibulum*, and of consequence be deposited into the *pelvis*, and conveyed to the *ureter*.

The blood is transmitted to the kidneys by the renal or emulgent arteries, one (sometimes two) to each, that descend a little to reach the sinusses, where, subdividing into two or three branches, they ramify farther, and surround the pelves and infundibula with arches or anastomoses, from which the cortical substance is copiously supplied with extreme branches.

The blood is returned by corresponding veins, that, emerging from the sinusses, produce the emulgent veins, of which the left is the longest; because it passes before the aorta to reach the vena cava.

The nerves sent to the kidneys are derived from the renal plexus; and the lymphatics from them reach the thoracic duct.

The kidneys are situated between the peritonæum and quadrati lumborum muscles principally, and much surrounded with cellular substance.

It will be understood, that an incision, called nephrotomy, may be made from the lumbar region, so as to reach the pelvis of a kidney for the purpose of extracting the stone (calculus) without wounding the peritonæum; but that this must be a difficult and precarious operation.

It will farther be understood, that inflammation of the kidney (nephritis) ending in suppuration, may be so extended as to reach the lumbar muscles, &c. and not only become apparent but discharge its pus externally.

*Renal*



*Renal Capsules.*

These (capsulæ renales, glandulæ atrabilia-riæ) are two gland-like bodies, situated between the upper extremities of the kidneys and the spine; closely adhering to the former. Their middle portions are somewhat triangular.

In each is a small longitudinal cavity, containing commonly a black matter (atra bilis).

No excreting ducts have been discovered.

They have no other connection with the urinary organs except proximity.

May we suppose that the fluid contained in these capsules is a secretion, and that it is carried by the absorbents to the bottom of the thoracic duct, to promote the action of that principal vessel?

*The Ureters.*

These (ureteres) are two slender tubes, each about the size of a swan's quill; they are contractions, or continuations of the pelves of the kidneys respectively; they descend almost perpendicularly to the brim of the pelvis; passing before the iliac vessels, they sink between the pelvis and urinary bladder, to reach the posterior and under part of the cervix of the latter, through which they penetrate obliquely, and terminate on its surface by small oval orifices, about an inch distant from one another. The

slanting penetration has the effect of valves, and prevents regurgitation.

In some rare cases two ureters have been observed on one side.

Through their whole course the ureters lie behind the peritonæum.

### *The Bladder of Urine.*

This (vesica urinaria) is a large oval cyst or bag, situated in the anterior part of the pelvis, immediately behind the bodies of the ossa pubis, which are somewhat excavated for its reception.

The upper part or bottom (fundus) is covered with the peritonæum, reflected from the adjacent surfaces; the posterior part of its middle or body (corpus) is likewise covered by this membrane, from which it is reflected, in the male, upon the rectum, and, in the female, upon the uterus. The under part or neck (cervix) is surrounded with cellular substance, and terminates forwards, immediately behind the arch of the pubes, in a contraction or tube, called urethra.

The posterior and inferior part of the cervix rests on the rectum in the male, and on the vagina in the female; cellular substance alone being interposed: a circumstance to be carefully remembered by the surgeon, especially the lithotomist.

The

The bladder enjoys a structure either the same with, or very similar to that of the intestine.

The partial peritonæal coat has been already taken notice of.

The next or muscular coat is strong, and the fibres are so arranged as to draw the fundus towards the cervix; by which means its capacity is constantly proportioned to its contents.

At the cervix the fibres, under the name of sphincter vesicæ, have the power of shutting the beginning of the urethra, so as to detain the urine till an expulsive effort of superior force be made.

The interior membranous coat, analagous to the nervous and villous intestinal coats, and like those derived from the cutis and cuticula, are apparently continued so as principally to form the ureters, and perhaps the pelves and infundibula of the kidneys.

The internal or villous coat is raised into numerous little eminences, by follicles of the mucous class that prepare the mucus for protection against the action of the urine; which, when morbidly abundant, gives the disease called cystirrhœa.

When the bladder is distended its fundus can be felt like an internal tumour, by the hand properly applied on the hypogastrium, and the interstice between the peritonæum reflected from the abdominal muscles and brim of the  
the

the pelvis, is increased, so that the high operation for the stone may be performed without wounding that important membrane.

### *The Urethra.*

This, in both sexes, is a tube continued from and formed by the membranes of the bladder; and nearly resembles the ureters in size and structure.

In the female it is about an inch in length, and terminates in the common integuments of the pudenda, immediately without the arch of the pubes.

In the male it is much longer than in the female, for it stretches along the inferior part of the penis to its extremity, and terminates likewise in the common integuments, of which it is entirely constituted, as far as it is a urinary tube. But in this sex it answers a double purpose, being a seminal as well as a urinary duct; and, therefore, to enable it to propel the semen duly, a cavernous covering is super-added, which will be described along with the male organs.

It will be understood that a straight probe, or tube (the first is called staff, and the last catheter) may be introduced into the female bladder, by the urethra, for the purposes of surgery; but in the male these instruments must have a considerable curvature, to allow them to pass around the margin of the arch  
of

of the ossa pubis, and to mount into the bladder behind it, in the direction of the urethra.

Attention to this point is essential to success in the operations of sounding and catheterism; or in using the sound and catheter.

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### *The Genital Organs.*

The genital organs of the male are;

The testicles,

The penis.

Those of the female are,

The ovaria,

The uterus,

The Fallopian tubes,

The vagina,

The os externum uteri.

### *The Testicles.*

These (testes) are two oval glands that prepare the semen, and of course are the principal male organs, to which the other parts of the genital system are entirely subordinate.

The testes, after birth, are pendulous from, and situated below the rings of the external oblique abdominal muscles, in a cutaneous bag, named scrotum,

Each



Each testicle consists of a body, a process, called epididymis, and excreting ducts.

The body is undermost, and its extremities are turned forwards and backwards; the anterior one is highest.

The epididymis lies above the body of the testicle, and is somewhat like a leech in shape.

The body of the testicle consists of cellular lobules, easily separated from one another, but all attached to the upper part of the testicle that corresponds to the epididymis, which some call its dorsum.

Each lobule contains a delicate convoluted tube, or excreting duct, that runs towards the dorsum.

The whole of these ducts, to the number of twelve or fourteen, pass along the dorsum, towards the anterior extremity of the testicle, and then emerge and form the anterior part or beginning of the epididymis, which some call its head (*caput epididymidis*) under the name of *vasa efferentia*.

The *vasa efferentia* unite into one tube, that, admirably convoluted, forms the epididymis; which, at its posterior extremity, is reflected upon itself, and gradually enlarges and tends upwards to the abdominal ring, under the name of *vas deferens*, and passes within the abdomen, and immediately sinks between the corresponding side of the bladder and pelvis, to reach the beginning of the urethra, where it meets with its fellow; they penetrate the

the urethra, by the sides respectively of a longitudinal eminence, called *verumontanum*, and *caput gallinaginis*, on its back part, immediately without the sphincter of the bladder.

From the testes to the abdominal rings the *vasa deferentia* are of considerable size, and can be felt easily with the fingers, like small cords; within the rings they become wider, but lose their firm texture, because they are not subjected to much pressure.

The testicles receive their blood from the aorta, near the emulgent arteries, through two slender arteries, named spermatic (indeed the right one generally arises from the emulgent artery); they run down divergingly to the rings respectively, and reach the epididymides and borders of the testicles, to which they are minutely dispersed, for the most part, in a serpentine manner.

The blood is returned by veins, named spermatic, that mount to the rings in various branches that form anastomoses, and called *vasa pampiniformia*; which disposition they somewhat retain within the rings, in their course towards the vena cava, near the kidneys, into which those of the right testicle end, in one tube; as do those of the left in the left emulgent vein.

From the rings to their terminations, the spermatic veins are connected with the arteries of the same name, and constitute two vascular cords behind the peritonæum.

A great number of lymphatic vessels arise from the body of the testes and epididymis, and run up with the blood-vessels to the ring, to pass through conglobate glands within the abdomen, and join with the rest of the absorbent system.

The spermatic artery and veins, the vas deferens and lymphatic, between the testicle and ring, are connected by cellular substance, and form a vascular bundle, under the name of spermatic cord, which can be readily felt.

The body of the testes and greatest part of the epididymis have two coats.

The innermost, which immediately invests their substance, called *tunica propria*, *albuginea*, and *adnata*, is smooth and polished on its outer surface that respects the other coat, named *tunica vaginalis*; the inner surface of the latter is likewise smooth, so that they may glide on each other.

The *tunica vaginalis* very much resembles the pericardium. It seems to be continued along the cord, but so disposed as to leave no cavity betwixt it and the vessels, although it be sometimes called the *tunica vaginalis* of the spermatic cord.

In the Myology it is noticed that the cremaster, derived from the internal oblique, surrounds the spermatic cord, and terminates in an expanded manner in the exterior and adjacent surface of the *tunica vaginalis testis*. In consequence of this disposition the testicle can

be drawn upwards; a circumstance that protects the vessel against its weight, and occasionally contributes to propel the semen.

Between the tunica propria and vaginalis testis, is the seat of the local dropfy, called hydrocele testis: this sometimes acquires vast magnitude, so as to contain several pounds of fluid, which is almost always the effect of previous disease of the testis, and especially of its lymphatics; by the coalition of the coats at the epididymis, the fluid is prevented from rising up within the cord.

Near the openings of the vasa deferentia into the urethra, there is a cellular process sent back from each, called vesiculæ seminales; they lie along the inferior part of the cervix of the bladder, and respectively on the outside of the vasa deferentia.

The connection of these receptacles with the vasa deferentia is such, that they may receive the seminal fluid by regurgitation, like as the gall-bladder does the bile.

Lying between and covering the extremities of the vesiculæ seminales and vasa deferentia, is a bilobular and somewhat triangular gland, named prostate, that has excreting ducts which open into the urethra, and is of the mucous kind.

This can be felt by the finger in recto, and is entirely or partly cut, in a lateral way, in the lateral operation for the stone.

The testes and their coats are contained in a bilocular sac, called scrotum, that hangs from the pubes, groins, and anterior part of the perinæum.

Immediately within the integuments of the scrotum (which are peculiarly thin) and closely adherent to them, is a fine muscular expansion, called dartos, that seems to be disposed from above downwards, for it corrugates the scrotum by drawing it towards the attachment already described.

The dartos has a complete partition or septum that divides it into two lateral cavities, one for each testicle.

Between the dartos and the tunicae vaginales testium a very lax cellular substance is interposed, which allows to the testes a degree of locomotion, with respect to the scrotum and one another, that contributes much to their protection.

When serous fluid occupies this cellular substance, it gives anasarca scroti; which is to be carefully distinguished from hydrocele testis.

On the surface of the scrotum, running back from the penis to the perinæum, is a prominent line that corresponds to the septum, called raphe, or futura scroti, that is likewise continued to the anus in both sexes; the latter portion may be named futura perinæi.

*The*



*The Penis.*

The penis, frequently called *membrum virile*, is principally made up of three portions of cavernous or cellular substance; one belongs to the urethra, and may be called *portio cavernosa urethræ*; the other two, placed together laterally, are *corpora cavernosa penis*.

The cavernous substance of the urethra begins about an inch from the prostate gland, under the name of bulb of the urethra, because it is considerably thick; of course between the prostate gland and the bulb, the urethra is entirely membranous,

This cavernous covering of the urethra gradually decreases towards the middle; but at its extremity it is suddenly expanded into a knob, called *glans penis*: it might be called the anterior bulb of the urethra.

The extremity of the urethra is situated on the inferior part of the *glans penis*, so as to have no cavernous below.

The superior extremity of each *corpus cavernosum*, small and pointed, under the name *crus* is attached firmly to the corresponding ramus of the *os pubis* and *ischium*. The two meet and form an acute angle immediately before and under the *symphysis pubis*, where they acquire their full size: they are divided from one another by an imperfect septum, so  
that

that the cells of the one, from place to place, communicate with those of the other.

The anterior extremities of the corpora cavernosa, become somewhat small, terminate at the root of the glans penis.

These substances are invested by a very firm membranous substance, common to both; this preserves their shape, and prevents over-distension.

The cavernous part of the urethra has a proper dense membranous covering, so that no communication exists between its cells and those of the corpora cavernosa; and consequently the former may be distended without the latter, and *vice versa*.

Blood is carried to the penis by the arteriæ pudicæ internæ chiefly; their extremities communicate with the cells of the cavernous substance, and thus occasions the erection or distension of the penis.

The veins originate, at least partly, from the cells of the cavernous substance, and return the blood principally to the internal iliac veins; and hence the erection ceases. A large superficial branch on the upper part, or dorsum of the penis, is called vena ipsius penis.

A ligament, named suspensory, connects the beginnings of the corpora cavernosa to the symphysis pubis.

The common integuments are connected to the surface of the cavernous membrane by  
very

very loose cellular substance; a little behind the glans they form a duplicature, more or less extensive, called præputium, that generally covers the greatest part of the glans, which below is connected with a longitudinal doubling, that runs to the extremity of the urethra, under the name of frænum.

The integuments of the glans are exceedingly delicate and vascular, and, near the præputium especially, abound with sebaceous or mucous follicles, by some called odoriferous glands.

At the orifice of the urethra the integuments are obviously inflected, so as to form the membranous part of the tube in the way explained.

The integuments in the urethra have many lacunæ that lead to the mucous follicles; their orifices are turned slantingly forward.

These pour out the mucus for defence, and are principally affected in gonorrhœa virulenta, and are the chief source of the discharge.

The glands of the glans are often much affected in the above-mentioned disorder, and produce the gonorrhœa spuria.

The penis derives its nerves chiefly from the sacral branches; they impart exquisite sensibility to the præputium and glans, particularly the latter.

Considerable lymphatic vessels, that originate from the præputium and glans, run along the  
'orsum

dorsum of the penis, to the inguinal glands respectively, and thus join with the general lymphatic system.

This circumstance explains the production of bubo, in consequence of ulcer, called chancre, on the glans or præputium.

It is now obvious that the penis is entirely subservient to the testes; in every respect calculated to produce a proper emission of semen; which can never happen but when a complete distension or erection exists.

### *The Ovaria.*

The ovaria are situated, one on each side, near the brim, in the extremities of its long diameter.

These organs a good deal resemble testicles in their form and other circumstances; and accordingly were so denominated, very generally, by the ancients\*.

They are tied, each by a short ligament, to the bottom of the uterus, and covered by the peritonæum, or lining membrane of the belly.

The covering is smooth and unbroken in the young subject; but, in the adult, it often exhibits rents, or scar-like marks, cor-

\* Casseri Tab. Anat. XIX. NN. XX. XV. The word Ovarium is not employed by this author.

responding to dusky substances within, named corpora lutea \*.

Vesicles, about fifteen in number, consisting of a pulpy membrane, are discoverable among the cellular and vascular substance of the ovaria; which, being ruptured, become corpora lutea §.

Blood-vessels, called spermatic, similar in origin, course, and form to those so named in the male, are bestowed on the ovaria.

### *The Uterus.*

The uterus, or womb, resembles a flattened ovoid, and is situated more or less in the superior axis of the pelvis.

This organ has

- 1 Fundus, or bottom,
- 2 Corpus, or body,
- 3 Cervix, or neck.

The bottom is uppermost.

The flattened sides of the body are turned to the os sacrum and os pubis respectively.

Its edges coincide with the transverse diameter of the pelvis.

\* HALLERI Prim. Lin. Physiol. sect. DCCDLXXVIII.

§ ----- sect. DCCDXIXI.-----In ovario etiam teneræ virginis sedent bullæ rotundæ, membrana pulposa firmula, factæ cellulosis fibris; undique ad ovaria adnexæ, qua coagulabili lymphâ replenter, increto numero, quindecim in uno ovario et ultra, &c.



The cervix, about an inch and half long, is usually terminated by two eminences, one before and one behind, separated by a transverse chink or rima.

This chink is the orifice by which the uterus communicates with the vagina; the eminences project a little like the snout of the tench, therefore sometimes called *os tincae*; but oftener *os uteri internum*, or internal orifice of the womb, in distinction to the external one.

From the middle of the rima a contracted passage leads to a small triangular cavity, very limited in its extent from the fore to the back part, and joins the inferior angle of this cavity.

The side opposite to this angle corresponds to the fundus.

Each of the other angles is perforated by a uterine tube.

A share of the fore part of the body, the whole of the bottom, and hind part, are covered by the peritonæum.

The anterior portion of its body and neck, not invested by this membrane, are in immediate contact with the bladder of urine; a circumstance deserving to be well remembered in the detection and management of several diseases.

The uterus is of considerable and pretty equable thickness. It consists of

- 1 A thick membrane, which has been supposed to be muscular, interwoven with numerous

numerous blood vessels, among which the veins greatly predominate; on this account it has been considered as a congeries of vessels, connected together by cellular substance \* :

2 A lining membrane, more or less smooth, reflected through the os internum, and continued along the cavities of the uterine tubes.

The uterus is connected loosely to the sides of the pelvis and adjacent parts, by

- 1 Ligaments,
- 2 Cellular substance.

A doubling of the peritonæum, extending from its edges to the sides of the pelvis, nearly in the course of the transverse diameter are its broad ligaments, or ligamenta lata.

From the lateral points of its bottom, two cord-like substances, round ligaments, or ligamenta rotunda proceed, one on each side, along the brim of the pelvis, to the rings of the abdominal muscles, through which their extremities pass a little.

These are in a considerable degree vascular § ; and seem to regulate its position during the gravid state ||.

The fore part of its cervix is connected with the bladder by cellular substance.

\* See an elegant Treatise de Morbis Peritonæi, by Dr. WALTER, Senior, a very eminent and indefatigable Anatomist in Berlin, illustrated with two valuable plates of the uterine vessels,

§ Dionis Chirurgie.

|| Winslow's Exposition Anatomique.

In a few cases this organ has had two cavities, or been double:

### *Fallopian Tubes.*

These go off from the lateral angles of the cavities of the uterus transversely, in a waving manner, each covered or invested by a fold of the corresponding broad ligament.

Their terminations, near the brim of the pelvis, are turned somewhat back towards the ovaria.

These are trumpet-like, and surrounded with a fringe or border, resembling foliage \*, by some called *morfus Diaboli*.

The size, at the termination, is equal to that of one of the wing-feathers of the smaller birds. It gradually diminishes towards the uterus, which it penetrates by a winding course.

They are covered by the broad ligaments between the round ones and the ovaria.

I have found them in concretion with the ovaria, and sometimes impervious.

### *Vagina Uteri.*

This is a tube five or six inches long, very capacious and distensible.

The upper extremity, continuous with the substance of the uterus, embraces the os inter-

\* Halleri Fasciculi.

num in such a manner that this projects a little, and can be distinctly felt by the finger, Accordingly, ascertaining the state of it is a principal object of touching, or the exploratio obstetrica.

From the os internum, the vagina is continued forwards and downwards, nearly along the inferior axis of the pelvis.

The termination, named external orifice of the womb, or os uteri externum, is situated between and almost equidistant from the anus and arch of the ossa pubis.

It forms, with the uterus, a very obtuse angle, almost coinciding with the axes of the pelvis \* ; a circumstance that makes its posterior side a little longer than its anterior one.

Like the uterus, it consists of

1 A dense exterior membrane, evidently continuous with that of the uterus at its superior end, and the cutis vera, or true skin, at the inferior one ; but much less vascular than that of the former :

2 A lining membrane, continuous with that of the uterine cavity, and with the cuticula or scarf-skin.

Thus it appears, that the vagina and uterus are productions, or internal processes of the common integuments, under special modification.

## PRINCIPLES OF ANATOMY.

The inflection of these by the os externum is obvious.

The interior surface, during the virgin state, abounds with numerous little eminences, seemingly cavernous, which are much altered or obliterated by child-bearing \*.

Many glands, of the mucous kind chiefly, are scattered along the vagina and cervix uteri, in the latter situation, named *vesiculæ Nabothi* §; which separate the defending and lubricating fluids.

The connection with the adjoining parts deserves to be fully marked.

Before, it is in contact with the neck of the bladder, and the urethra through its whole length; and behind, with the *intestinum rectum*.

### *Os Externum.*

This, strictly speaking, is the inferior part of the vagina; but the expression is generally regarded as equivalent to *pudenda*, *vulva*, or *sinus muliebris*.

The *os externum* begins with the *mons veneris*, a prominence of the integuments, placed upon the *ossa pubis*, and ends about two inches before the extremity of the *os coccygis*.

Two prominent folds of the integuments,

\* HALLERI Fasciculi. This great and ingenious man has paid much attention to the rugose or cavernous portion of the vagina.

§ PLENCK'S Elem. Art. Obst.



named labia magna, inclose the sides of this opening.

These gradually lose their prominence and size as they proceed to the posterior part of the margin of the vagina.

At puberty the labia and the mons veneris begin to abound with hair.

Between their beginnings is apparent the point of the clitoris, covered more or less by a semicircular fold of the Integuments, called præputium; both somewhat resemble the penis, and are exquisitely sensible.

Extending from the clitoris backwards, are two small doublings of the integuments, of various length and projection, situated within, and generally concealed by the labia magna, called, therefore, labia minora, or nymphæ; they terminate at the anterior part of the vagina, and are very vascular.

Between their posterior extremities, and immediately before the vagina, is placed the orifice of the urethra, or passage of the urine, a tube continued from the bladder, somewhat more than an inch long, and equalling a swan's quill in capacity.

At each side of the orifice of the urethra is a considerable mucous lacuna.

Behind the urethra, and in contact with it, is the orifice of the vagina, or, in a strict sense, the os externum.

This opening is narrowed, generally till the sexual commerce has taken place, by the hy-  
men,

men, a membranous border, or doubling of the integuments, of a semilunar or circular form \*; its fragments are carunculæ myrtiformes.

The whole of the os externum is extremely delicate, exceedingly vascular, and copiously stored with mucous and other glands, that furnish fluids for protection.

The interstice between the os externum and anus, about an inch long, is perinæum.

This is subjected to great distension during parturition.

A cavity between the vagina and perinæum is fossa navicularis; this is bounded laterally and behind by the fourchette ‡, which is seemingly ligamentous.

The vagina is connected to the bottom of the pelvis by a muscle, called levator ani; and to the anus and os coccygis by another, named sphincter ani: a continuation of this last, on each side of it, is constrictor cunni.

### *The Gravid Uterus.*

The uterus is gravid when it contains the embryo, foetus, or child.

This state is termed gravidity, pregnancy, and utero-gestation.

\* HALIERI Fasciculi.

‡ SMELLIE's Midwifery.

In proportion as the child acquires bulk, the uterus is distended in all its dimensions; it still, however, preserves its former shape\*.

The bottom, as pregnancy proceeds, rises gradually above the brim of the pelvis, following nearly the direction of the axis.

By the fourth month it exceeds the ossa pubis §, and at last reaches considerably above the umbilicus, pushing upwards and aside the adjacent bowels.

The round ligaments, put somewhat on the stretch, regulate the position of its bottom in this elevated condition ||.

The ovaria are drawn from their usual residence within the pelvis.

The cervix is gradually raised and shortened, and its cavity proportionally widened; at last the prominences bounding the os internum are totally effaced.

During this change the thickness is not much diminished; the substance, however, becomes lax and spongy, and its vessels much enlarged; a condition somewhat resembling that which the common integuments acquire when gradually distended by tumour.

The flesh-like appearance of the uterine substance has induced some authors to confi-

\* ALBINI Tabulæ.

ROEDERERI Tabulæ.

HUNTER'S Gravid Uterus.

§ PLENER'S Elem. Art. Obst.

|| DIONIS' Chirurgie.

der it as a muscular organ \* ; an idea by no means to be readily credited, because it is repugnant to

- 1 Appearance in the unimpregnated state,
- 2 Function,
- 3 Analogy &c.

### *The Child.*

The foetus has the following specialities :

- 1 Umbilical chord,
- 2 Placenta,
- 3 Membranes,
- 4 Liquor amnii,
- 5 Urachus,
- 6 Foramen ovale,
- 7 Ductus arteriosus,
- 8 Canalis venosus,
- 9 Unexpanded lungs,
- 10 Membrana pupillaris.

### *Umbilical Chord.*

The umbilical chord, or funis umbilicalis, consists chiefly of

- 1 Two arteries,
- 2 One vein.

\* Dr. HUNTER's Gravid Uterus.

§ See Dr. WALTER's Treatise, before quoted, in which he denies the existence of muscular fibres, and supports his opinion by many ingenious arguments.

The arteries are direct productions or continuations of the hypogastric or internal iliac ones reflected, one on each side of the bladder. Running before the peritonæum, they gradually approach one another at the umbilicus (navel) which is a ring.

These arteries, at the umbilicus, are in contact, pass through it, and proceed spirally along the chord, which is about two feet long, to its termination in the placenta; in which they are suddenly and minutely ramified.

The vein originates from the placenta at that part where the arteries enter it, and returns spirally to the umbilicus.

This large vessel passes through the umbilical ring, and is continued in an upward direction, before the peritonæum, to a cavity in the inferior surface of the liver, named sinus portarum, where it joins the trunk of the vena portarum.

These three vessels (the number is seldom varied) are connected by cellular matter, and covered by the integuments hereafter described.

### *Placenta.*

The placenta, or uterine cake, is a vascular mass, more or less circular, thickest in the middle, convex and lobular on the surface turned to the uterus, while it is slightly concave, or nearly plain on the opposite side.



It is chiefly formed by the minute ramifications of the umbilical arteries and veins, which appear beautifully serpentine and prominent on the surface corresponding to the chord.

The lobes, or subdivisions, correspond to the trunks of their vessels, by which they are formed.

By maceration they get the appearance of fine fringes or brushes.

The placental vessels and their lobes are connected by cellular matter, which pretty completely covers, as with a lamina, the uterine surface of it.

By the injection of proper fluids, particularly quicksilver, the rout and motion of the blood in it can be imitated fully.

### *Membranes.*

These form the cyst in which the child is inclosed, and resemble a distended bladder, accurately filling the uterine cavity. These are two,

1 Chorion, which is outermost, and consequently is in contact with the uterus.

The adhesion to the uterus, which is slender, is formed by a cellular substance, which has been named spongy chorion \*; and even regarded as a distinct covering, derived from

\* HALLERi Elem. Physiolog.

the uterus, under the appellation of *membrana decidua*, and *membrana decidua reflexa* \*.

This cellular substance never contains any fat or oil, and is evidently continuous with that of the rest of the body, in the same manner as the umbilical vessels are with the others.

The like continuity is to be remarked between the chorion and *cutis vera*, or true skin.

The placenta lies on the outside of this membrane, to which it closely adheres.

2 *Amnios*, which is innermost, comparatively thin, and is in contact with the chorion, to which it adheres through its whole extent, by means of a very fine cellular substance.

It is a continuity of the cuticle or scarf-skin.

Thus it appears that these membranes are a part of the integuments, and that the placenta and umbilical vessels are a part of the vascular system. They are indeed temporary and caducous, but analagous in this particular to some of the other parts, the teeth, the hair, &c.

The foetus, thus considered, is a complete œconomy, and may justly be said to be *totus in se atque rotundus*.

The placenta and membranes together are frequently called (*secundinæ*) *secundines*, after-birth, and after-burthen (*l'arriere faix*).

These are rudimental parts.

\* Dr. HUNTER's Gravid Uterus.

Spallanzani, that ingenious and acute naturalist, has seen them in form of a pellucid vesicle in eggs, before fœcundation and incubation \*.

They seem to be as essential to the growth of the animal as the root is to that of the vegetable.

The fœtus has been considered as an ovum or egg §. The analogy either does not exist at all, or is not close.

The chorion and amnios, delicate and pellucid, in general are easily torn.

Their blood-vessels must be small.

No nerves nor absorbents have been discovered in them.

### *Liquor Amnii.*

This, commonly called waters, completely fills the cavity of the amnion.

It is in various quantity, and exceedingly mild; and seems to be a secretion from the child obviously intended for protection and facilitating parturition.

### *Urachus.*

This is a tube that goes directly from the bottom of the bladder, between the umbilical

\* Dissertations relative to Natural History, vol. ii. p. 56. 159.

§ SMELLIE'S Midwifery.

arteries, and becomes impervious before it reaches the navel.

*Foramen Ovale.*

This is a large hole, provided with a valve, in the partition of the auricles of the heart.

*Ductus Arteriosus.*

This is a short tube, forming a passage from the pulmonary artery to the aorta,

*Canalis Venosus.*

This tube stretches between the sinus venæ portarum and vena cava.

*Unexpanded Lungs.*

The lungs, unexpanded and comparatively heavy, sink in water before respiration takes place.

It does not follow that the swimming of the lungs, or their being lighter than water, is an infallible mark that the child to which they belonged had been born alive; although the contrary is full evidence that respiration had not taken place.

Attention to this circumstance is of high importance in the anatomia forensis, or judicial anatomy.

*Membrana*

*Membrana Pupillaris.*

This is a delicate film in the pupil \*.

*Form of the Fetus.*

This is pyramidal; the head, being of greatest circumference, is the base of the pyramid.

The trunk and limbs may be transmitted through any opening by which the head has passed.

*Situation of the Fetus.*

The bulk of the head seems to be inversely as the age, and always bears a great proportion to that of the other parts, and may be a chief cause of its being very constantly turned downwards, or presented to the os internum.

The abundance of the liquor amnii, during early pregnancy, favours the gravitation of the head (hence it is turned downwards very generally); and permits the twisting or entangling of the chord about the neck or limbs, and, what is more remarkable, the knotting of it.

\* Dr. GERRARD of Liverpool, my ingenious friend, has lately published an inaugural dissertation, in which the above, and other circumstances of discrimination of the fetus, are accurately treated.



*Structure of the Skull at Birth.*

The ossification of the skull being incomplete, allows it to change shape according as it is pressed, and thus favours parturition.

*Form of the Head.*

The human brain, and consequently the head, is of an egg-like shape.

The forehead is the small, and the hind-head the great extremity.

The long axis stretches from the one extremity to the other; and the short one, cutting this at right angles, extends from ear to ear.

*The Thorax.*

The osseous and containing parts of the thorax or chest have been already described in the Osteology and Myology.

*The Pleuræ.*

The chest is lined and its contents covered by two membranes, called pleuræ, nearly in the same manner as the abdomen and its viscera are by the peritonæum.

The pleura is a simple lamina; its external surface is connected to the contiguous parts

by cellular substance, while the internal surface is smooth and glistening.

The pleuræ may be considered as two bladders, lying longitudinally within, and filling the chest, and forming two cavities that may be called pleuritic.

The partition of these cavities consists of the touching laminae of both pleuræ, and extends between the spine and sternum, under the name of mediastinum; and its portions are called posterior and anterior, according to situation.

It will be understood that the heart, covered by the pericardium, and the thoracic portion of the great vessels, &c. lies between the mediastinal laminae, and of consequence without the pleuræ.

The anterior mediastinum ends before the pericardium; of course a part of this membrane lies naked immediately behind the inferior extremity of the sternum, and therefore may be opened, when dropical, through a trepanned hole of the point of the sternum, without wounding the pleuræ.

The pleuræ covers the upper surface of the diaphragm, except the tendinous portion that is attached to the pericardium, as described.

It will be understood that the pleuræ cover the whole of the internal surface of the ribs, and internal intercostal muscles, under the name of costal pleuræ.

The

The pleuritic membranes are not obscurely sensible, and not much vascular. They have been supposed to be the seat of the inflammation called pleurisy (pleuritis).

### *The Thoracic Viscera.*

Besides the heart and great vessels, the thoracic viscera are,

- 1 The lungs,
- 2 The thymus,
- 3 The œsophagus.

### *The Lungs.*

The lungs (pulmones) are a spongy substance of great volume, divided into right and left portions (of which the first is largest); they occupy the whole of the pleuritic cavities, fill, however, on the outside of the pleuræ, by which they are covered; and these membranes are so far called pulmonary pleuræ.

Scissures, more or less deep, divide the lateral portions of the lungs into lobes, of which there are generally six.

The substance of the lungs is almost entirely vascular; for it consists of,

- |             |            |
|-------------|------------|
| 1 Air       | } vessels, |
| 2 Blood     |            |
| 3 Lymphatic |            |

connected by cellular substance, and covered by the pleuræ; which last fix them to the

spine, under the name of ligaments of the lungs.

### *Air Vessels.*

The lungs are truly a pneumatic organ, because principally made up of proper air-vessels, of which there are none else in our bodies.

The trunk of the air vessels is chiefly cartilaginous, and extends from the os hyoides to the heart, under the name of trachea, and aspera arteria.

The trachea, from its beginning to the sternum, is very superficial, and can be readily felt on the fore part of the neck.

The upper part, consisting of five cartilages, described in the Myology, is the largest, and is called larynx, and by some pomum Adami.

The trachea consists principally of imperfect cartilaginous rings (their deficiencies are behind, and correspond to the diaphragm) connected by ligaments; the first adheres to the cricoid cartilage.

Behind, and almost opposite to the base of the heart, the trachea divides into two branches, one to each lateral portion of the lungs, which enter the roots of the lobes, and are suddenly and minutely subdivided.

After the trachea is subdivided, it gradually loses its cartilaginous structure, and takes the name of bronchia.

The

The extremity of each bronchial branch is connected with numerous vessels or cells, all communicating with one another, that form a lobule more or less angular.

The pulmonary lobules are exceedingly numerous ; indeed they are almost the whole of the lungs ; for the blood and lymphatic vessels are principally dispersed in their interstices.

A cluster of these lobules, corresponding to a bronchial branch, makes up one of the lobes.

It will be understood, that air blown into the trachea inflates the whole of the lungs ; that, when thrown into one of the primary branches, it only distends the corresponding lateral portion ; that, when injected into a secondary branch, it fills a lobe ; and, when into an ultimate one, a lobule.

Thus it appears that there is no communication between the cells of one lobule and those of another, but through the bronchial tubes : an admirable artifice intended by Nature to contribute to our preservation from many diseases.

The common integuments from the mouth, having covered the epiglottis, pass down through the glottis, and, by means of two transverse ligaments extended between the thyroid and arytenoid cartilages, form a recess on each side, under the name of ventricles of the larynx : they are continued so as to line not only the trachea but the bronchia, and perhaps form the cells, so that the air  
or



or matter in them is on the surface of our bodies.

These pulmonary or bronchial integuments abound with glands which prepare the protecting mucus, and are often morbidly affected.

### *Blood Vessels.*

The pulmonary artery, it has been observed in the Angiology, immediately after it has got beyond the pericardium, divides into two great primary branches; these take a direction to the lateral portions of the lungs respectively, and are subdivided into secondary ones that correspond to the lobes, which are suddenly and minutely ramified, so as to be copiously dispersed on the surface of the cells, into which many exhalant branches would seem to open, and which perhaps emit the halitus and the mephitis or phlogiston, that escape with the air in expiration.

The extreme pulmonary arteries (the exhalant branches excepted) are reflected, and become veins; which, uniting from point to point, form trunks, two on each side, that end in the left auricle of the heart, under the name of pulmonary veins.

The course of the pulmonary arteries and veins among the lobules is nearly the same.

It was formerly mentioned, that small arteries, under the name of bronchial, arise from the aorta, enter the lobes, and are dispersed  
for

for the purpose of nourishing the lungs, or becoming *vasa vasorum*.

It will be understood, that as the bronchial surface is of great extent, and the extremely numerous pulmonary vessels are spread on that surface, that the air in the cells and the blood in its vessels are almost in mutual contact.

### *Lymphatic Vessels.*

The pulmonary lymphatics are exceedingly numerous.

They originate from the air vessels and the cellular substance, and tend towards the roots of the lobes, and edges of the lateral portions of the lungs; and then pass through conglobate glands, and, it would seem, terminate in the thoracic duct.

In this course some of these vessels are superficial, and are easily perceived and injected with air, mercury, &c.

There are probably numerous conglobate glands in the lungs, through which these vessels pass.

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The lungs derive their nerves from the pulmonary plexus, &c.

After respiration or breathing has taken place the lungs become fully dilated, and fill the pleuritic cavities completely; so that the pulmonary

pulmonary and costal portions of the pleuræ are in contact, and the former glides somewhat on the latter.

This contiguity, in consequence of inflammation, produces adhesion or concretion, which are very frequent; a circumstance carefully to be attended to by the surgeon about to perform the operation called paracentesis thoracis.

### *The Thymus.*

This is a mass, seemingly glandular, situated in the upper and anterior part of the chest, between the pleuræ, and of course above and somewhat before the pericardium.

It is much greater in the young than old subject; a circumstance somewhat common to all the glands.

No excreting ducts have been discovered.

### *The Oesophagus.*

The oesophagus, or gullet, may be considered as the beginning of the alimentary tube: it extends from the pharynx (the muscular part of which is already described) to the cardiac orifice of the stomach, immediately before the bodies of the adjacent vertebræ, and behind the trachea and pericardium; and between the pleuræ in the posterior mediastinum.

This tube enjoys the intestinal structure: its muscular coat is peculiarly thick, evidently to enable it to push the morsel downwards with due

due celerity. It is to favour this action that the posterior part of the bronchial cartilages is deficient.

As the pharynx, or beginning of the œsophagus, and fauces, constitute one cavity; it is easy for the surgeon to introduce the probang or flexible probe, so as to extrude the morsel or other substance impeded in it, and producing proportional suffocation.

Upon occasion, not only probes but injecting tubes may be passed along the œsophagus to the stomach, for various purposes.

These circumstances deserve to be well recollected.

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### *The Eye.*

The eye-balls (bulbi oculorum) the organs of vision, situated in the orbits, are of exquisite mechanism; they are nearly spherical, and consist of membranes, called coats (tunicæ) and humours (humores).

The coats are,

- 1 Conjunctiva,
- 2 Albuginea,
- 3 Sclerotica,
- 4 Choroides,
- 5 Retina.

The humours are,

- 1 Aqueus,
  - 2 Cryſtallinus,
  - 3 Vitreus.
- 

### *Tunica Conjunctiva.*

This conjunctive coat is partial : it only covers the anterior ſurface of the eye-ball.

It ſeems to be nothing other than the common integuments continued from the interior ſurface of the eye-lids. It prevents air, &c. from being inſinuated unduly backwards.

This coat is very vaſcular and ſenſible, like the integuments, under every modification ; hence pain and redneſs (ophthalmia) when irritation is applied to it.

### *Tunica Albuginea.*

This lamina, commonly called the white of the eye (albugo oculi) ſeems to be an expansion of the tendons of the ſtraight muſcles, and extends from where they touch the eye-ball to the circle in which the white ends.

### *Tunica Sclerotica.*

The ſclerotic coat is the moſt ſubſtantial and extenſive, and principally prevents alteration of the ſhape of the eye-ball.



On account of an obvious difference of structure it is divided into two portions, named opaque and pellucid.

The opaque portion (*sclerotis opaca*) is the posterior and largest, and seems to be continuous from the inner lamina of the dura mater, that covers the optic nerve ; its back part is thickest.

Where the opaque portion ends the pellucid one, commonly called cornea (*scleris pellucida*) begins, and completes the inclosure : it resembles a segment of a sphere, smaller than the eye-ball, applied on its anterior surface, and hence is somewhat prominent.

It is covered by the *tunica conjunctiva*, but not by the *albuginea*.

### *Tunica Choroides.*

The choroid coat, of a brown colour and less substantial than the *sclerotis*, is perhaps derived from the *pia mater*, and, like it, consists of two laminae ; the interior one has been called *membrana Ruyfchiana*.

The *choroides* adheres loosely to the *sclerotis*, except at the division of the pellucid and opaque portions, where the adhesion is close, and named ciliary circle (*orbiculus ciliaris*) ; and when separated a white line appears.

The segment of the choroid coat, anterior to the ciliary circle, leaves the pellucid cornea and forms a perforated partition in the cavity

of the eye-ball ; the anterior surface, being variegated, is called iris ; and the posterior one uvea ; and the hole, which is accurately round, is the pupil (pupilla).

Behind the uvea, and nearly corresponding to the orbiculus ciliaris, are numerous duplicatures of the membrane of Ruysch, called ciliary processes (processus ciliares) which, gradually becoming less prominent as they proceed backward, soon disappear ; they are disposed like rays, and form a circle, which has been called improperly ciliary ligament (ligamentum ciliare).

In the foetus a delicate membrane fills the pupil, under the name of membrana pupillaris.

The pupil is occasionally contracted and dilated, probably by muscular fibres, still, however, preserving its circular form.

### *Tunica Retina.*

The retina, so far from being a coat of the eye-ball, is the eye itself, or the immediate organ of vision ; and to it all the other coats and parts are accordingly subservient.

The retina, derived from the optic nerve, which enters the eye-ball in a point not exactly opposite to the pupil, is a delicate mucus-like expansion which adheres to the interior surface of the choroides, and ends at the ciliary processes.

A small

A small tubercle, corresponding to the axis of the optic nerve, can be marked from which the retina seems to originate ; this is insensible to light.

Thus it seems probable that the sclerotis, choroides, and retina are nothing other than an expansion of the optic nerve, admirably suited to its function.

### *Humor Vitreus.*

The vitreous humour, transparent, and about the consistence of the white of an egg, occupies about four fifths of the eye-ball, and is backmost ; so that its anterior surface, which has a small depression in its middle, nearly coincides with the plane of the ciliary circle.

A delicate membrane, seemingly of two laminae, surrounds the vitreous humour, under the name of capsule ; the exterior one is in contact with the retina throughout, while the interior one is supposed to form septa, and consequently cells, in which the humour is lodged ; hence the whole has been called vitreous substance (*substantia vitrea et corpus vitreum*).

### *Humor Crystallinus.*

The crystalline humour is pellucid, and more consistent than the vitreous one, to which it bears a very small proportion : its form is  
lenticular,

lenticular, hence it is commonly called the crystalline lens (*lens crystallina*).

The crystalline lens is partly lodged in the depression in the anterior surface of the vitreous humour mentioned, consequently it is in the axis of the eye-ball, and immediately behind the pupil, through which, especially when its pellucidity is diminished by disease, it can be seen.

The lens is invested with a capsule, formed, as would seem, by the two laminae of the vitreous capsule receding from one another, so that the interior one is behind, and the exterior one before the lens: by this disposition a small triangular space, as is alledged by Petit, exists around its margin, containing a little watery fluid; hence named *canalis Petitianus*.

Around the exterior capsule of the vitreous humour, by some called *membrana hyaloidea*, and corresponding on one side to the *canalis Petitianus*, and on the other to the ciliary ligament, is a circle of radiated dusky lines caused by the ciliary processes, which at least are in contact with the capsule, collectively named *zona ciliaris*.

The lens, it would appear, consists of laminae, peculiarly disposed and variously dense, a circumstance that prevents an artificial one from fully answering the purpose of the natural one.

The lens is a good deal spherical in the foetus, but afterwards becomes considerably compressed, and somewhat straw-coloured.

A loss

A loss of pellucidity, to a certain degree, is a disease called cataract.

### *Humor Aqueus.*

The aqueous humour is very similar to water, and fills what of the anterior part of the cavity of the eye-ball is not occupied by the others; consequently it touches the pellucid cornea before, and the anterior surface of the capsule of the lens behind; and is divided into two portions by the uvea, which communicate through the pupil: of these the foremost is said to be in the anterior, and the other in the posterior chamber of the aqueous humour (*cameræ anterior & posterior humoris aquei*).

It will be understood, that the quantity of the aqueous humour is greater than that of the crystalline one, and that it has no proper capsule, because this would interfere with the motion of the uvea, or contraction of the pupil.

These humours are unquestionably prepared by a secreting act of the effusing vessels; and, to counterbalance absorption and dissipation, a constant renewal becomes necessary.

The aqueous humour is suddenly restored, even after a total loss; while an effusion, not very great, of the vitreous one is irreparable: a circumstance that ought to be well known to the oculist.

Many



Many of the branches of the ophthalmic artery, that enter the sclerotic coat from point to point, reach the choroid one, and ramify on it in all directions, under the name of *vasa vorticosa*; at least, the corresponding veins have this vorticoso disposition.

The central branch of the last-named artery that runs in the substance of the optic nerve, and corresponds to the tubercle or *punctum non videns*, sends arteries to the choroid coat, retina, and humours.

The arteries of the anterior part of the choroid coat anastomose so as to form a circle near the *orbiculus ciliaris*, from which the iris, &c. is supplied with branches, called *ciliary arteries*.

The blood is returned by the ophthalmic veins to the external jugulars.

The vascular condition of the eye-ball is manifested by profound ophthalmia, and anatomically by injections; in consequence of which the parts become almost entirely red.

The nerves that enter the orbit, particularly the third pair and first branch of the fifth, form the *ganglion ophthalmicum*; from which branches are propagated to the various parts of the eye-ball, and impart sensibility and motion; but seeing entirely depends upon the optic nerves modified into the *retinae*.

The rays of light that fall on the pellucid cornea are transmitted and refracted by the humours, so that the focus or picture is formed  
that

that touches more or less exactly the retina, and gives the sensation that we call seeing, or vision; the perfection of which entirely depends on that of the mechanism.

It has been observed that an opacity of the crystalline lens is called cataract; which, it will be understood, diminishes vision, by intercepting the rays of light.

Surgery proposes to remove the cataract by,

1 Depressing or moving it from the axis of the eye-ball, so as to allow the rays to be transmitted; an operation commonly called couching the cataract:

2 Extracting it from the eye-ball altogether through the pupil, and through an incision of the pellucid cornea; an operation called extraction of the cataract:

3 Wounding it, without depressing or extracting, to procure its solution and disappearance; an operation named detrition of the cataract.

As there is not sufficient space in the posterior chamber of the aqueous humour to hold the displaced cataract, it seems to be proper, in couching, to lodge it in the vitreous humour, by the couching needle passed a little behind the uvea, and managed with such caution as to preserve the anterior lamina of the crystalline capsule entire.

The incision of the pellucid cornea, for extraction, ought to be equal to half its circumference, and parallel and near to the ciliary

circle ; and performed so as to preserve this and the iris from injury.

The lens is expelled by cautious pressure on the eye-ball, after wounding the anterior lamina of its capsule ; and, when well done, the posterior one is entire, and no part of the vitreous humour is effused. This step of the operation is exceedingly delicate.

It has been observed already, that a total derangement of the eye-ball is the necessary consequence of a considerable effusion of the vitreous humour ; hence the great importance of not wounding its capsule.

The surgeon, before he attempt these operations, ought to be well acquainted with the parts.

The eye-ball has a great variety of subservient apparatus :

- 1 Muscles,
  - 2 Eye-lids,
  - 3 Glands,
  - 4 Lachrymal passages.
- 

### *Muscles.*

The muscles of the eye-ball and eye-lids, amounting to eight, have been described in the Myology.

*The Eye-lids.*

Each eye-ball has two lids (*palpebra superior et inferior*) that, like a sphincter curtain or valve, shut or cover it when we are said to wink; these form two angles (*canthi*) one external, next the temples, and one internal, and greatest, next the nose.

The upper eye-lid is largest, and possesses the greatest quantity of motion; so that the eye is principally shut by its moving downwards.

Each eye-lid is chiefly formed by a semilunar concave cartilage, named *tarsus*.

The straight edge of the *tarsus* of the upper eye-lid is turned towards that of the under one; they mutually touch, by their outer margins, when the eye is shut; so that a triangular gutter is formed between them and the eye-ball, to allow the tears to glide towards the internal angle.

The posterior edges of the *tarsi* are tied to the brim of the orbit, by means of membranes that seem to be productions of the *periosteum*.

It has been mentioned in the *Myology*, that the *levator* muscles of the eye-lids are attached to the posterior edges of the upper *tarsi*; and that to them the upward motion of the upper eye-lids is to be ascribed.

It has also been mentioned, that the *orbicularis palpebrarum* is spread over the *tarsi*, and, like a sphincter, shuts the eye by moving both eye-lids.

The common integuments are obviously inflected through the opening of the eye-lids, under a change of modification, such as is to be observed in their other inflections; and thus line the inside of the tarfi, and cover the anterior part of the eye-ball, under the name of tunicae conjunctivæ, as explained.

A particular species of hairs, arranged in rows, is implanted in the external edges or prominent angles of the touching margins of the eye-lids, and are called eye-lashes, or cilia.

### *Glands.*

The pellucidity of the cornea, and mobility of the eye-ball could not be preserved without protecting and lubricating fluids, which are afforded by,

- 1 Glandula lachrymalis,
- 2 Glandula innominata,
- 3 Glandulæ Mybomii.

The glandula lachrymalis is situated within the orbit, in the depression, near the external angular process of the frontal bone, mentioned in the Osteology.

This gland, which is of the compound or conglomerate kind, is about the size and form of a small flattened hazel nut; it seems to produce several excreting ducts, that open on the lining membrane of the upper eye-lid, and pour out the watery liquor, commonly called  
the



the tears, which is continually and uniformly spread over the conjunctive coat by the motion of the eye lid: a circumstance essential to its lustre; hence the dull and glazed eye of the sick and dead.

This gland is so situated that it may be cut out, when diseased, without wounding the tunica conjunctiva.

Glandula innominata, or caruncula lachrymalis, is a small mass that makes a prominence in the internal angle of the eye-lids, and is distinguished by a fold of the tunica conjunctiva between it and the eye ball: small hairs can be observed growing from it.

This gland seems to be of the mucus or sebaceous kind, and its liquor intended to protect the angle and prevent the tears from overflowing in certain attitudes.

Glandulæ Mybomii are numerous, and situated between the tarfi and lining membrane of the eye-lids; they resemble white lines, and each has a small orifice near the roots of the cilia, from which a sebaceous or unctuous matter is effused.

These glands are the seat of the swelling and inflammation, called hordeolum and commonly the sty.

### *Lachrymal Passages.*

The channels by which the tears are conveyed from the eye to the nose are named lachrymal passages (viæ lachrymarum).

The

The lachrymal passages are of unequal capacity in different parts: they begin by a small round orifice in the margin of each eyelid, near the internal canthus, called puncta lachrymalia: they can be easily seen in oneself.

From the puncta lachrymalia two slender tubes, named lachrymal canals, proceed convergingly to the orifice of the osseous passage, described in the Osteology, where they unite, and are suddenly expanded into what is called the lachrymal sac (sacculus lachrymalis); from which a contraction or tube leads down to the nose, under the name of lachrymal duct (ductus lachrymalis): its extremity is not wider than the cavity of a crow's quill.

The common integuments, inflected by the puncta, variously expanded and joining with those of the nose, form the lachrymal passages.

It is highly consequential to the surgeon to be well acquainted with these passages; as not unfrequently they become diseased and obstructed, and produce much inconvenience; particularly that kind of ulcer, named fistula lachrymalis.

It is obvious they may be injected by various substances, from each extremity, with a view to render them pervious\*.

\* I suggested the idea of injecting quicksilver into these passages, in the same manner as we do into small vessels, for anatomical purposes (see Systematic Elements of Surgery). In two years afterwards my acquaintance Mr. BLIZARD executed it. See Philos. Transf.

When

When the duct is obstinately obstructed a perforation is made from the sac, ulcerated or previously opened, through the os unguis into the nasal cavity, between the ossa spongiosa, to be preserved as a new passage; this is the operation for the fistula lachrymalis, which is not a little troublesome and precarious.

In general it may be asserted, that it is the safest method to consolidate the ulcer, and neglect the perforation.

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### *The Ear.*

The organ of hearing, as mentioned in the Neurology, is formed by the portio mollis of the seventh pair of nerves, expanded principally in the cavity named tympanum, described in the Osteology.

The tympanum is separated from the external ear (meatus auditorius externus) by a perfect membranous septum or partition, called membrana tympani, that can be seen, in situ, in a good light.

The meatus auditorius is partly osseous and partly cartilaginous, as noticed in the Osteology.

The external orifice is very considerably expanded, as every one knows, in a backward direction; and has slender muscles to communicate

nicate motion, which generally have a very obscure action in the human kind.

The integuments, after covering the expanded orifice of the ear, are inflected, and line the tubular part of the passage, and terminate upon the membrana tympani, and constitute its external part; so that the lining of the passage may be compared to the integuments of the finger inverted.

The integuments of this meatus abound more or less with hair and glands, that may be called ceruminous; because they separate the protecting matter, called cerumen, or ear-wax.

There is reason to conclude, that a morbid state of these glands gives a running of matter, called by some otirrhæa, that sometimes is of a purulent appearance.

Behind the ears numerous sebaceous glands are situated, that give a glazed appearance to the surface by the diffusion of their liquor, which has a particular odour; and, in the child, are often observed to give a discharge that seems to be purulent.

The cerumen becomes sometimes unduly abundant and indurated, and consequently causes deafness, by hindering the undulations of air, that excite the sensation of sound, from touching the membrana tympani: this can be seen, and may be removed by probes, or injection dexterously performed.

From

From the tympanum the Eustachian tube or passage extends inwards and forwards, and ends near the corresponding posterior opening of the nose by a cartilaginous orifice, not a little resembling the external ear in miniature.

The integuments from the nose and fauces are inflected through the orifices of the Eustachian tubes, and cover the tympana, the bones they contain, and the other cavities, and form the inner surface of the membrana tympani, which thus probably consists of four laminæ.

The cartilaginous orifice preserves it open, which seems to be a circumstance necessary to distinct hearing; and it will be recollected, that such is its situation with regard to the nose, that a probe or tube, properly curved, may be introduced into it with a view to render it pervious when obstructed by mucus, or the like.

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### *The Nose.*

The nose is a very considerable cavity, formed by the bones of the face, as appears from the Osteology; of which the openings before and behind are named nostrils.

The anterior nostrils are completed by at least four cartilages, which have, by their elasticity, an excellent effect to elude violence.



Through the anterior nostrils the common integuments are inflected, and line the whole nasal cavity with its sinusses and cells, under the name of Shneider's membrane (*membrana Shneideriana*) ; and through the posterior ones are continuous with those of the fauces.

It was noticed in the Neurology, that the first pair of nerves, having descended through the holes of the ethmoid bone, became the organ of smelling, and hence the name.

For this purpose the olfactory nerves are expanded under very delicate and special modification, principally in the upper part of the nasal cavity, and interwoven with the nasal integuments.

The lining membranes of the nose are obviously very vascular : their numerous arteries are derived from the external carotids ; hence hæmorrhage from this surface (*epistaxis*) often happens ; and not seldom relieves or prevents disease in the head, &c. depending on plethora.

When the *epistaxis* is so abundant as to require to be suppressed, it has been proposed to plug up the nostrils, which is a very practicable idea.

The superior portion of the nasal membrane is much covered with glands that furnish the mucus or puita ; on this account by some named pituitary membrane.

It is not improbable that the polypus, often met with in the nose, is an induration and tumour

mour of one or more of these glands, somewhat in the stile of schirrus.

Hairs are implanted in the anterior nostrils, of such form and disposition as to prevent the admission of the more palpable matters, with the air, in inspiration.

It has been already mentioned, that the frontal sinusses, communicating with the ethmoidal cells, open into the superior part of the nasal cavity; and the sphenoidal ones above and behind; and the maxillary ones laterally.

These last have their orifices situated between the ossa spongiosa, and are about the size of a transverse section of a goose-quill, and accessible to the probe and perforator, when obstructed; a circumstance to which surgeons seem not to have paid sufficient attention; for they have generally ordered the maxillary sinus to be perforated from a socket of a tooth, or the external surface.

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### *The Mouth.*

The integuments are inflected over the lips, where they become very delicate, and, on account of numerous vessels, acquire a florid colour.

Under this modification the integuments line the inside of the cheeks, and reach the alveolar processes of both jaws; at the ante-

rior part of which, near the roots of the incisor teeth, two duplicatures are formed, under the name of *frænula labiorum*; they then become thick and dense, are called gums (*gingivæ*) and cover the processes last-named, having perforations, except in infancy, equal to the number of the teeth, with which there is often a very close adhesion.

From the alveolar process of the under jaw the integuments are continued over the bottom of the mouth to the tongue, forming with the under part of it a duplicature, called *frænum linguæ*, which is sometimes so narrow and extended forwards as to prevent sucking. This requires incision.

The integuments cover the tongue entirely, exhibiting a longitudinal line on the middle of its upper surface that leads to a foramen cœcum or lacuna near its root.

The lingual nerves, particularly the ninth pair, peculiarly modified, are bestowed on the integuments of the tongue, and become the organs of taste; the prominent extremities of these nerves, called *papillæ*, can be easily distinguished in many animals.

The tongue, almost entirely a muscular organ, is capable of motion in every direction; and hence becomes immensely important in mastication, articulation, &c.

The integuments from the upper gum line the osseous palate, and are dense and corrugated till they arrive at the soft and moveable

able palate, the velum pendulum palati, the under part of which they completely invest, joining behind with those of the nose, which cover its upper part.

The mouth may be considered to terminate in the contraction at the root of the tongue, mentioned in the Myology under the name of *isthmus faucium*.

In the triangular spaces in the sides of the *isthmus faucium*, between the lateral arches, are lodged two flat glands of the compound and mucus kind, named tonsils (*amygdalæ*).

The surface of the tonsil turned to the *isthmus* is cellular, and formed into *lacunæ*, in which the excreting ducts would seem to open; and the whole is covered by the integuments of the mouth, passing on to the *fauces*.

The tonsils are frequently the seat of inflammation (*cynanche tonsillaris*); of venereal secondary ulcer; and of *schirrus*, that requires excision.

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### *The Fauces.*

That cavity included between the *isthmus faucium* and the opposite cervical vertebræ, is called *fauces*. It is bounded on the sides by the carotid arteries and the adjacent parts, and above by the cuneiform process of the occipital

tal bone, and part of the body of the sphenoidal one.

The fauces are lined, and chiefly formed by the integuments continued from the mouth and nose, so as to resemble, when disengaged, a membranous bag with seven openings, viz. the posterior nares, the Eustachian tubes, the isthmus faucium, pharynx, and glottis.

The faucial surface abounds with mucous glands or follicles, part of which can be seen from the mouth. They are frequently affected by venereal ulcer, which I have seen reach the adjacent vertebræ; and, in one instance, produce anchylosis.

It will now be understood, that a probe or tube may be introduced by the nostrils to the fauces, œsophagus, and stomach; as also by the mouth to these organs, and additionally to the trachea. These facts demand every attention from the ingenious practitioner.

### *The Common Integuments.*

The common integuments, coverings, or involucra of the various organs forming the animal system, are membranous substances, and are,

- 1 Cellular substance,
- 2 True skin,
- 3 Reticular membrane.
- 4 Scarf-skin,

*Cellular*



*Cellular Substance.*

The cellular or fatty substance or membrane (*tela celluosa*, *membrana adiposa*) is situated immediately within the true skin.

This substance is not a simple lamina ; on the contrary, it is variously compounded, and in general formed into cells that contain for the most part an oil (*adeps*) ; hence the name.

The cellular membrane is variously abundant, and appears obviously under different modifications. The cells mutually communicate, and, with few exceptions, contain oil which they seem to prepare in consequence of a glandular power ; at least no other organs capable to do this have been pointed out.

Processes, as they may be called, from this membrane sink between all the included parts, and even their fibres with little exception ; so that it may not absurdly be considered as a general cement or connecting medium.

The great comparative bulk and extent of this substance in health, may be conceived of from the shrinking that is produced in many diseases ; for the abundance of the oil gives corpulence, and the contrary, emaciation, and consequently the *facies Hippocratica*.

Nature has wisely prevented, by a diversity in the structure, the accumulation of oil in these parts where it would be inconvenient and hurtful ; the eye-lids, genitals, &c.

It

This oil is alledged, with considerable probability, to be an internal stock of food or nutritious matter on which the absorbents may seize in case of necessity ; and hence the sudden leanness when common food is denied.

The blood-vessels are minutely ramified upon the cells of this substance ; the arterial ones, no doubt, perform the secretion of the oil.

The cells are frequently the seat of disease :

1 Inflammation, which readily becomes suppurative, and more or less destroys its texture :

2 Dropsy (anasarca) in which, when partial, the fluid transudes from one place to another, according to situation ; it always possesses the lowest :

3 Hæmatocele, ecchymosis, thrombus, or tumour occasioned by extravasated blood :

4 Emphysema, pneumatosis, or swelling caused by extravasated air, which sometimes has become general.

The sudden disappearance of some of those swellings, is a proof that many absorbents originate from the cells.

The medullary membrane within the bones, seems to be very similar to the adipose substance, and has been observed to suffer the like changes by disease.

*True Skin.*

The true-skin (*cutis vera*) situated immediately on the outside of the cellular membrane, is the principal integument. It is a single membrane of various density and modification; and, besides the membranous fibres, which are intricately interwoven, and seem to run in every direction, it consists of

1 Blood-vessels, exceedingly numerous, and variously dispersed; some of the extreme arteries it would seem terminate on the surface by open mouths, so as to be called exhalants (*vasa exhalantia*):

2 Lymphatic vessels, of which a great number originate from the cutaneous surface, as appears by many facts---inoculation, mercurial inunction, &c.:

3 Nerves, which give acute sensibility, and in many places appear in the form of points or papillæ:

4 Glands, which are various in kind, and exceedingly numerous, as is shewn by their secretions. It is probable that the eruptive diseases take their pustular form from being principally seated in these.

The inward numerous and important processes or inflections of this extensive membrane have been occasionally described.

*Reticular Membrane.*

This delicate substance (*corpus reticulare Malpighi*) is expanded along the external surface of the true skin; and is described as having meshes that correspond to the papillæ. It is the seat of the discriminating colour in the negroe.

It may be a peculiar modification of the cellular substance, forming the connection of the true and scarf skins, between which it is situated. In the erysipelatous inflammation it becomes the seat of effusion, which, when considerable, produces vesication or blister.

*Scarf-Skin.*

The scarf-skin or cuticle (*cuticula, epidermis*) is the most superficial integument. It is easily separated from the rest by epispastics, putrefaction, &c. and appears to be a single lamina of various density, in which no fibres or vessels can be traced. It has been supposed to be made up of minute scales.

The exhalant and absorbent vessels necessarily have orifices in the scarf-skin, through which the perspiration and absorption take place; these are commonly called pores of the skin, and are consequently very numerous.

It is as devoid of nerves as of vessels, and therefore has no sensibility; on the contrary it seems intended to obscure the sensation of the  
true

true skin, which otherwise would be intolerable, and destructive of our commerce with surrounding bodies.

It seems highly probable that this almost unorganized covering is nothing else than the expanded extremities or orifices of the amazingly numerous vessels, that begin from, or end on the surface.

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### *The Hairs and Nails.*

Hairs abound variously over the surface of the integuments, and seem to be intended for protection.

The nails are placed on the ends of the fingers and toes.

These substances follow the fate of the scarf-skin, especially when affected by putrefaction, and consequently fall off with it; on this account some have supposed them to be produced by it. It seems, however, to be more consentaneous to analogy to regard them as partaking considerably of a vegetable nature, and consequently maintaining a connection with the integuments and body in general, like plants with the soil.

It may be a deduction from the foregoing remarks, that hair, nail, horn, hoof, beak, claw, feather, fin, scale, prickle, and whalebone, are species or varieties of one vegetable  
O 2 animal



animal plant ; and their diversity referable to general and specific qualities.

The colour seems to depend on the kind and arrangement of the interstitial matter, which is accordingly susceptible of change more or less suddenly.

The integuments thus appear to be most excellently calculated to be the surface of our system, by which the due intercourse and connection with external bodies is formed.

It is evident that no substance can be said to have entered the system while it is simply in contact with or lies on the integuments ; as is the case with the food in the stomach and intestine, air in the lungs, &c.

By any distending power acting slowly the integuments may be much stretched, as happens in pregnancy, dropsy, and subcutaneous tumour in general ; and the vessels acquire a proportioned size. They gradually recover their proper dimensions when the distending cause is removed, provided they have not become highly morbid. This circumstance should prevent the surgeon from cutting off any part of them unnecessarily in his various operations ; on the contrary they ought to be carefully and proportionally preserved in the amputations ; because a speedy cicatrization entirely depends on them. In a proper attention to this circumstance consists a chief modern improvement in surgery.

## A D E N O L O G Y.

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**I**T has been premised that Adenology treats of the glandular system, which consists at least of

- |              |           |
|--------------|-----------|
| 1 Simple     | } glands. |
| 2 Compound   |           |
| 3 Conglobate |           |

A simple gland or follicle (*glandula simplex*) is formed by an artery, peculiarly modified to convey the blood and make a secretion, and a vein to reconvey the blood, after the secretion has taken place, to the common mass; and an excreting duct or cavity, to carry off or contain the secreted matter.

These glands are for the most part small.

A compound gland (*glandula composita vel conglomerata*) consists of many simple glandules, that receive their blood from the same source, and have a common excreting duct or ducts, constituted by a small one sent out from each glandule.

Many of these glands are of great size; as the liver and pancreas.

A con-

A conglobate gland (*glandula conglobata*) is pervaded by one or more lymphatic vessel; and does not seem to perform any secretion, at least no excreting vessels have been pointed out as issuing from it, unless the lymphatics be regarded as such.

The number of conglobate glands is exceeding great, and their size is various.

The glands have been called according to the matters (which are considerably numerous) they prepare; salivary, biliary, &c.

The simple glands are copiously dispersed over the integuments, as has been mentioned, and are chiefly of the sebaceous and mucous kinds; and named, from situation, lingual, labial, &c.

Disease soon interrupts the functions of these glands; therefore the sagacious physician pays due attention to the state of the skin, tongue, &c.

The large compound glands are placed wherever a great secretion is wanted: thus the lachrymal glands are devoted to the eyes; the parotid, maxillary, and sub-lingual ones to the mouth; and the liver and pancreas to the intestine.

The thyroid gland is a bilobular mass; the body or middle is situated on the inferior part of the larynx, while the lobes, one on each side, stretch down on the sides of the trachea, sometimes nearly to the sternum: excreting ducts have not been discovered. It receives

its

its blood from the superior and inferior thyroid arteries, mentioned in the Angiology.

The middle part of this gland is generally wounded in the operation called bronchotomy, and a brisk hæmorrhage ensues, which, if circumstances permit, ought to be restrained before the trachea be opened, for the most obvious reason.

The maminae, or breasts, more or less pyramidal and prominent from the fore part of the chest, are collections of milk-glands.

The numerous glands are connected by vessels and cellular substance.

The cellular substance forms a kind of investment or cyst about them, loosely attached to the contiguous muscle, so as to permit a degree of gliding. It adheres more closely to the integuments, particularly the areola or disk, about the nipple (papilla).

The nipple is a bundle of the trunks of the excreting ducts of the milk-glands; it contains about twenty, and carries in its top the like number of corresponding orifices. The cellular matter binding them together is peculiarly elastic, and, by corrugating them, performs in some degree the function of a valve, preventing somewhat the escape of the milk.

The disk abounds obviously with sebaceous glands for protection.

The milk glands begin to be evolved about the thirteenth and fourteenth years, in this climate

climate, and give proportional size to the breasts.

The mammary and epigastric arteries furnish blood to the glands.

Their absorbent vessels run through numerous conglobate glands to the axillary ones.

These organs are by function interested in parturition and its consequences.

On account of the smallness and intricacy of the glandular vessels, obstruction and disease frequently exist in them; therefore the practitioner ought to be well acquainted with their structure and situation.

The mammary glands frequently become scirrhus, especially in the female, in the decline of life. It is not easy to determine whether the milk or lymphatic glands are primarily affected; but in the advanced scirrhus state both certainly become morbid; and when effusion happens, the acrid matter is readily conveyed by the numerous absorbents to the axillary glands, which in consequence become enlarged, and equally diseased; and from these it is extended to others, and to the system at large.

The true and safe plan of treatment of such disease is to remove it completely by amputation: this, experience has fully shewn. Obviously, therefore, the sooner the better; for after the axillary glands are affected the event becomes exceedingly doubtful, and, indeed, the execution of the plan often impracticable.

THE



*The Blood.*

**I**T was observed in the introduction, that the blood is that fluid which naturally fills and is circulated in the arteries and veins.

*Sensible Qualities.*

- 1 Colour : this is generally red.
- 2 Taste : this is bland.
- 3 Temperature : this is about ninety-six degrees of FARENHEIT's thermometer.
- 4 Quantity : this is various ; in an adult it has been supposed to be about fifty pounds.

*Composition.*

The blood is a heterogenous mass, as appears by its decomposition, which is

- 1 Spontaneous,
- 2 Chemical.

By spontaneous decomposition are obtained,

- 1 Halitus,
- 2 Crassamentum,
- 3 Serum.

*Halitus.*

The halitus is the steam or vapour that is exhaled from newly extravasated blood. It is comparatively in small quantity; its smell is betwixt that of urine and sweat.

*Craffamentum.*

The craffamentum is the cake, grume, or coagulated part that is lowest in a quantity of cold blood, which therefore appears to be heaviest.

This substance consists of

- 1 Globules,
- 2 Coagulable lymph.

*Globules.*

The globules are generally red, and notwithstanding the name are not spherical, but rather spherules very much compressed. It seems probable that they are considerably organized, for in each a small particle is visible, which has been supposed to be contained in a vesicle.

The diameter of a globule has been computed to be the 3240 part of an inch; and is, notwithstanding, specifically heavier than water or serum.

The

The proportion of the red particles to the other parts of the blood is various, and may be considered to be greatest in the florid and sanguine subject.

*The Coagulable Lymph.*

The coagulable lymph is a whitish and glutinous matter that has a strong tendency to become solid, or coagulate, especially when extravasated; and thus is easily obtained by itself.

It is this remarkable tendency to become solid that gives the following phænomena:

1 The general and seemingly uniform but temporary coagulation of newly effused blood:

2 The formation of the crassamentum; which probably happens in consequence of the serum being squeezed out by the adunation of this matter while it entangles the red part:

3 The whitish crust or buff that often covers the upper part of the crassamentum, and is frequently of great thickness and solidity:

4 The concretions (polypi) often discovered in the great vessels after death, of which they have been supposed to be the cause:

5 The laminated condition of the contents of aneurysm often met with:

6 The appearance of thread-like or worm-like substances, when flowing blood is mixed with heated water:

7 The spontaneous stopping of hæmorrhage from the smaller vessels :

8 The formation of the mole or false conception (mola).

### *The Serum.*

The serum is the greenish, bluish, or water-like fluid that floats above and about the crassamentum in extravasated blood properly circumstanced.

This fluid, often called serosity, contains,

1 Gluten, coagulable by heat, in great proportion :

2 Salt, chiefly of the neutral and muriatic kind, in small quantity :

3 Water, various as to proportion.

In some instances it has been observed to be white.

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By chemical decomposition or analysis, blood is reduced into

1 Volatile alkali ;

2 Water ;

3 Empyreumatic oil ;

4 Coal (caput mortuum) ; which contains neutral salt, earth, and some particles affected by the magnet.

The

The spontaneous decomposition of the blood is the most satisfactory; because, by reuniting the halitus, &c. we in some measure reproduce blood, which in no degree happens by mixing the products of the chemical one. Indeed these are the same, only varied in proportion, whether a whole animal or any of its parts be subjected to this analysis.

A general conclusion is, that the blood is a peculiar fluid not to be produced by art, nor indeed by nature, as far as appears, except by what may be called the animal process, to be afterwards considered.

There seems to be no reason to conclude, since the blood is a compound and seemingly organized fluid, that it may not occasionally be the seat of disease in the first instance.

Every one knows that great hæmorrhage is followed instantly by weakness or death.





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P R I N C I P L E S  
O F  
P H Y S I O L O G Y.

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*Life.*

**P**HYSIOLOGY considers the body as animated or living, and endeavours to explain the actions or functions of the various organs, described by anatomy, that constitute the phaenomena or symptoms of life.

As the functions in every instance depend on the mechanism or structure of the organs (for they are invariably affected by every cause that affects this); it is a necessary consequence that life is not a principle superadded to organization, but the effect of it; therefore we may safely regard the terms, life, vitality, vital principle, living principle, excitability, &c. as synonymous, and expressing a condition of the organs only.

It

It farther follows, that as perfect organization is the immediate source or proximate cause of life must also be that of health; therefore an alteration, derangement, and extinction of it must be that of disease and death.

It is not the province of the physiologist to comment on the immortal and immaterial part of man, commonly called the soul. Matter is his object: all beyond it is fitly left to the metaphysician.

All the functions either immediately spring from or much depend on the nervous system; which every circumstance shews to be the principal organ, to which all the others are subservient, like so many tools or instruments.

The brain is the chief part of the nervous system; but the human brain is larger than any other; and, therefore, if it be admissible to consider the brain as the animal, man is the largest animal in the creation: for the superior bulk of the whale, elephant, &c. arises from the instrumentary parts of their bodies.

Man derives his superiority among animals, not from the quantity only, but also from the quality of the brain; for the similarity of its substance in all animals, as far as inspection goes, and the diversity of its powers shew a generic and specific distinction; that is to say, there is an arrangement common to brain in general, and modifications of this, corresponding to kinds, species, and individuals.

The

The Author of Nature has in the most wonderful manner adapted the instrumentary parts of every animal to the specific qualities of the brain : thus the hands of a man could be of little or no use to the horse ; because the equine structure of the brain disqualifies him from duly employing them ; and so of any other animal.

### *Sensation.*

Experience shews that sensation or feeling is solely a function of the nervous system, and principally resident in the extremities of the nerves, which are therefore called sentient ; for if the nerves of any part be destroyed, sensation is likewise destroyed.

It is in general necessary that the substance to be felt should be applied more or less closely to the sentient extremities of the nerves.

Impressions thus received are communicated to the sensorium commune, through which alone, it seems probable, what is called the sympathy of the nerves takes place.

Thus it seems the nerves are so many productions from the sensorium commune, intended to act as feelers to receive and convey notices, that it (the animal) may act accordingly.

The mode in which impressions are thus communicated from the extremity of a nerve to the brain, and in which the nerve itself is

connected with the brain, is not ascertained ; we must remain contented with the knowledge of the fact till we become better acquainted with the mechanism.

It is proper to mention that the cortical part of the brain has been very generally regarded as glandular, and capable to secrete a subtile matter called nervous fluid and animal spirits, supposed to be the medium of the intercourse in question.

All nerves are not fitted to receive every occurring impression properly, and therefore we observe that certain ones are devoted to certain impressions, called organs of the senses : five may be specified.

### I *Smelling.*

The first pair of nerves are the organ of smelling (*odoratus*) and on this account called olfactory. They are fitted by their organization to be impressed by the volatile matter that continually issues from odoriferous bodies, and occasionally diffused in air that is inhaled in respiration \* ; with much propriety therefore  
situated

\* Natural philosophy informs us, that all animal and vegetable bodies, and probably all or most other bodies, while exposed to the air, are continually sending forth effluvia of vast subtilty, not only in their state of life and growth, but in their states of fermentation and putrefaction. These volatile particles do probably repel each other, and so scatter themselves in the air, until they meet with other bodies to which they have some chemical affinity,



situated in the nasal cavity, where they are at once duly exposed to the impregnated air, and protected from rude and destructive substances.

Animals, whose subsistence and safety depend on acuteness of this sense, have the nerves large and the ossa spongiosa much convoluted, to give them sufficient extension.

## 2 *Seeing.*

The second pair of nerves are the organ of seeing (*visus*) and therefore named optic, and are so delicately constructed as to be impressed by light, one of the most subtile matters known \*.

nity, and with which they unite, and form new concretes. All the smell of plants, and of other bodies, is caused by these volatile parts, and is smelled wherever they are scattered in the air: and the acuteness of smell in some animals, shews us, that these effluvia spread far, and must be inconceivably subtile.----REID'S Inquiry into the Human mind.

\* The rays of light which minister to this sense, and of which, without it, we could never have had the least conception, are the most wonderful and astonishing part of the inanimate creation. We must be satisfied of this, if we consider their extreme minuteness, their inconceivable velocity, the regular variety of colours they exhibit, the invariable laws according to which they are acted upon by other bodies, in their reflections, inflections, and refractions, without the least change of their original properties, and the facility with which they pervade bodies of great density, and of the closest texture, without resistance, without crowding and disturbing one another, without giving the least sensible impulse to the lightest bodies.----REID'S Inquiry into the Human Mind.

It is unnecessary to say, that the body seen does not touch the optic nerves or retinae; the various rays reflected from its surface, transmitted and refracted by the coats and humours, impress the retina, and excite vision.

Distinct vision results from the mechanism of the eye-balls being perfect; for if the retinae be not duly sensible the pictures will not be perceived; and if the crystalline humour be too spherical, or the contrary, the images will fall before or behind the retinae, and consequently not make the requisite impression.

Physiologists have disputed much about the cause, why an object seen with both eyes should appear single? This perhaps happens because with respect to the sensorium the two optic nerves being of the same modification, and similarly impressed by pictures of one object falling on corresponding parts, act as one\*. It seems to be easier to conceive this to be the case, than that one object seen in such circumstances should appear double.

\* From these phenomena, and from all the trials I have been able to make, it appears evidently, that in perfect human eyes, the centres of the two retinae correspond and harmonize with one another; and that every other point in one retina, doth correspond and harmonize with the point which is similarly situate in the other; in such manner, that pictures falling on the corresponding points of the two retinae, shew only one object, even when there are really two: and pictures falling upon points of the retinae which do not correspond, shew us two visible appearances. although there be but one object.---REID'S Inquiry into the Human Mind.

It is no easy task to explain why objects appear not inverted, because their pictures are always inverted at the retinae. Are we to refer this to habit, or to a law of nature? At any rate it seems to be certain, that our preceptions by the eye are much assisted by the other senses, and by experience\*.

### 3 *Hearing.*

The seventh pair of nerves, expanded in the tympana and cavities of the ossa temporum, are the organs of hearing, therefore called auditory.

Hearing results from the impresson of the undulations of the air, or sound on the auditory nerves; to collect and direct which, the cartilaginous parts are excellently calculated:

\* It will, without doubt, be allowed, that I see the whole object in the same manner and by the same law by which I see any one point of it. Now, I know it to be a fact, that, in direct vision, I see every point of the object in the right line that passeth from the centre of the eye to that point of the object: and I know likewise, from optics, that the rays of light that comes to the centre of my eye, passes on to the retina in the same direction. Hence it appears to be a fact, that every point of the object is seen in the direction of a right line passing from the picture of that point on the retina through the centre of the eye. As this is a fact that holds universally and invariably, it must either be a law of nature, or the necessary consequence of some more general law of nature. And, according to the just rules of philosophising, we may hold it for a law of nature, until some more general law be discovered, whereof it is a necessary consequence, which I suspect can never be done.---REID'S Inquiry.

in many animals they possess exquisite motion, so as to be instantly turned in any direction\*.

The membranes of the drums are obviously intended to moderate the waves of sound, that they may not act too rudely and destroy the delicate nervous matter.

Water is a medium of sound, as appears from various experiments, and the ears of fishes,

#### 4 *Tasting.*

The ninth or lingual pair of nerves, expanded on the tongue, constitute the organ of tasting.

This organ is impressed by the sapor of

\* Sounds have probably no less variety of modifications, than either tastes or odours. For, first, sounds differ in tone. The ear is capable of perceiving four or five hundred variations of tone in sound, and probably as many different degrees of strength; by combining these we have above twenty thousand simple sounds that differ either in tone or strength, supposing every tone to be perfect. But it is to be observed, that to make a perfect tone, a great many undulations of elastic air are required, which must all be of equal duration and extent, and follow one another with perfect regularity; and each undulation must be made up of the advance and recoil of innumerable particles of elastic air, whose motions are all uniform in direction, force, and time. Hence we may easily conceive a prodigious variety in the same tone, arising from irregularities of it, occasioned by the constitution, figure, situation, or manner of striking the sonorous body: from the constitution of the elastic medium, or its being disturbed by other motions; and from the constitution of the ear itself, upon which the impression is made.---REID'S Inquiry.

bodies,

bodies: an active matter more or less soluble in the saliva\*.

Tasting, like the other senses, is variously acute in different animals, and in all is obviously intended to guard the entrance of the alimentary canal, and in general it may be trusted.

### 5 *Touching.*

The cutaneous nerves, formed into papillæ, are the organ of touch, which is very generally diffused over the surface of the whole body; but is most acute and distinct in the extremities of the fingers and toes, especially the former.

Solid bodies, which make comparatively a rude impression, and might therefore destroy the more delicate organs, are the object of this sense.

The acuteness of touch greatly depends on the state of the scarf-skin, which is stretched

\* It is probable that every thing that affects the taste, is in some degree soluble in the saliva. It is not conceivable how any thing should enter readily, and of its own accord, as it were, into the pores of the tongue, palate, and fauces, unless it had some chemical affinity to that liquor with which these pores are always replete. It is therefore an admirable contrivance of nature, that the organs of taste should always be moist with a liquor which is so universal a menstruum, and which deserves to be examined more than it hath been hitherto, both in that capacity, and as a medical unguent. Nature teaches dogs, and other animals, to use it in this last way; and its subserviency both to taste and digestion, shews its efficacy in the former.---REID'S Inquiry.

like



like a veil over the nervous papillæ; therefore wherever this is extremely delicate, sensibility is greatest, and vice versa.

### *Consciousness.*

The brain in general, but more especially the medullary part of it, appears from every fact and experiment to be the organ of the internal senses (*sensus interni*) consciousness, &c.

The intercourse between this supreme organ and external objects, is entirely dependent on the sentient nerves; that is to say, all impressions made on the latter excite corresponding sensations in the former.

The following opinions on this subject are not easily understood:

“As the nervous system is the medium interposed between the living principle and the several organs which compose the bodies of animals, an exact knowledge of its structure and functions must appear to the philosopher, as well as to the physician, of high importance in the study of nature \*.”

“But although, beyond the place at which a nerve is cut, or in a member amputated, a wound does not excite pain; yet, in consequence of that wound, effects follow which we cannot account for on mechanical principles.

\* Dr. MONRO'S Nervous System, p. 1.

“Thus

“ Thus, a slight puncture of the heart of a frog, separated from its body, throws all its fibres into violent motion. Such a cause appears so disproportionate to its effects, that we cannot help conceiving that some living principle has been influenced; or that there are two kinds of feeling, one with, and another without consciousness: the latter, perhaps, resembling that kind of feeling which we must suppose inherent in vegetables, and in consequence of which their vessels are so actuated as to produce still more numerous and wonderful changes on the fluids they convey and secrete, than are to be observed in the animal kingdom\*.”

“ When we throw into the scale the various effects of what has been commonly called the instinct of animals, does it not appear, that the most just, as well as most becoming conclusion we can draw, is, that the Power which created all things, which gave life to animals, and motion to the heavenly bodies, continues to act upon, and to maintain all, by the unceasing influence of a living principle pervading the universe, the nature of which our faculties are incapable of duly comprehending § ?”

\* Dr. MONRO's Nervous System, p. 88.

§ ----- p. 104.

*Muscular Action.*

The muscles may be considered as a collection of springs to move the other organs of the body relatively or absolutely ; a function called muscular action, motion, or contraction.

This moving power is peculiar to muscle ; so that wherever it is discovered the presence of muscle may be inferred, and *vice versa*.

When a muscle is in action it becomes shorter and harder than when inactive : action is excited by irritation or stimulus.

Those muscles that act in consequence of volition are called voluntary muscles ; and those which cannot be controlled by it are named involuntary muscles, or muscles of involuntary motion, *viz.* the vascular, the intestinal, and respiratory muscles.

Volition gives the necessary stimulus to the voluntary muscles ; and the regular application of other stimuli accounts for the action of the involuntary ones.

It is impossible to doubt that a peculiar mechanism or structure gives the capability of contraction to the muscles ; which seems to be what is by some called *vis insita* ; but that irritability may really happens a connection with the brain by nerves is in general essential, or a *vis nervea* must be present.

The nature of the *vis nervea*, or that influence communicated by the nerves to muscles,

is not understood: it is contended that it in some measure may be derived from the ganglia.

Muscles on opposite sides of any organ or member that counteract one another, called antagonist muscles, are necessary to an equilibrium of motion.

Muscular motion in the blood vessels is called pulsation, and in the intestine peristaltic motion, from circumstances,

### *Assimilation.*

Assimilation, or the animal process, denotes the change the food (ingesta) undergoes till it be fit to become a constituent part of the body, and therefore comprehends

- 1 Mastication,
- 2 Deglutition,
- 3 Digestion,
- 4 Sanguification.

### *Mastication.*

Food chiefly consists of animal and vegetable matters, which it is for the most part necessary to chew or masticate.

The teeth are the principal instruments of mastication; a task for which they are admirably

rably fitted. The cheeks and lips on the one side, and the tongue on the other, co-operate with the teeth by keeping the morsel within their action, which consequently, by an admixture of the saliva, is reduced to a pulp.

### *Deglutition.*

Mastication, when necessary, being accomplished, the morsel, by means of the tongue chiefly, is pushed into the fauces and pharynx, shutting the glottis as it passes, and then into the œsophagus and stomach by the constrictor muscles and peristaltic contraction of the œsophagus itself principally; a process named deglutition.

### *Digestion.*

The ingesta, in a great measure unchanged, fall into the stomach, which may be considered as a receptacle for such a quantity as ought to be taken at once.

Hunger, the sensation of want or emptiness, which we feel about the stomach when food is necessary, is probably caused by its being flaccid.

During mastication the food is blended with a considerable quantity of saliva; and in the stomach it meets with a secretion, not very copious; this joined with the drink makes the whole a semifluid; which exposed to heat and agitation in a considerable degree is gradually propelled



propelled through the pylorus into the intestine, where it is intermixed with the bile and pancreatic liquor.

Thus it seems evident, that this process, commonly named digestion, is analagous to what is called mechanical solution. If, however, it be unduly performed, a degree of the acetous fermentation soon arises (hence flatus and acidity) ; to check this, and at same time to promote the animalization, is a chief use of the bile, which is therefore by no means an excrementitious fluid.

The fine and fluid part of the digested mass, commonly called chyle, is very rapidly absorbed by the numerous lacteal vessels (so named on account of the milky appearance of the chyle) and conveyed by the thoracic duct to the left subclavian vein, where it is blended with the common mass of blood.

The coarse and insoluble part of the ingesta is propelled along the alimentary canal by the peristaltic motion, and, under the name of fæces, is accumulated in the rectum, which serves as a cloaca, and occasionally, by its irritation, is ejected by the anus.

### *Sanguification.*

The chyle, mixed and circulated with the blood, is gradually and completely assimilated and animalized or converted into blood ; a change called sanguification (*hæmatopoesis*)  
which

which is chiefly to be ascribed to vascular action in general, and not to that of any particular part, such as the lungs and spleen.

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### *Circulation of the Blood.*

That the blood is moved or circulated in its vessels, is manifested by

- 1 Hæmorrhage ;
- 2 Compression by ligature ;
- 3 The microscope ;
- 4 Anatomical injections.

The heart is the centre of this motion ; for the blood is conveyed from it in the arteries, and returned in the veins.

The veins open into or rather form the auricles ; consequently the venæ cavæ pour their blood into the right one, and the pulmonary veins into the left one ; so both are distended at the same time.

The blood is urged through the auricular orifices by the contractions of the auricles ; because it is prevented from a retrograde course by the *vis a tergo*, and the tricuspid and mitral valves readily yield, and of consequence both ventricles are distended.

The ventricles thrown into contraction, force their contents, the right one into the  
pulmonary

pulmonary artery, and the left one into the aorta ; because the tricuspid and mitral valves resist any tendency towards the auricles, while the sigmoid valves open towards the arteries ; therefore as much blood in a given time is transmitted through the lungs as through all the body besides.

The distended state of the auricles, ventricles, and arteries is termed diastole ; and their contracted condition, systole.

From what is premised it is plain, that the diastoles of the auricles and arteries coincide in point of time : that of the latter is termed pulsation and pulse, as before-mentioned.

The pulse is more frequent and rapid in the young than in the old subject : its medium number in the healthful adult, in one minute, is seventy-two, which amounts to 4320 in the hour, and 103,680 in the day.

It was already mentioned that the vascular muscle, or muscular coat of the arteries, is involuntary. The reason of this, and of its constant action, is the regular application of the stimulus of the blood, which probably is both mechanical and chemical ; because, when the blood by any cause is impelled with undue force towards the heart, the number and force of the pulse is increased.

It is a clear deduction, that if the stimulant power of the blood, or sensibility of the vessels, or both, be increased, that the circulation will be accelerated ; as happens more or less  
in

in fever, &c. and *vice versa*; and that there subsists a necessary relation between the state of the blood and vessels, which will ever render the transfusion of the blood of one animal into the vessels of another destructive or fatal.

The heart is the chief but not sole mover of the blood; for the vascular muscle co-operates, and is principally efficient in propelling it in the small vessels, where its action is called oscillatory motion, and oscillations.

It would seem that the blood's motion is most rapid in the greatest vessels, and nearest the heart, and *vice versa*, on account of the capacity of the ramifications being greater than that of the trunks\*; a circumstance highly favourable to nutrition and secretion.

Nature seems to have anxiously provided for a languid circulation in the brain, by the inflected course and mode of ramification of its arteries; a circumstance essential to its function.

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### *Nutrition.*

The augmentation or growth, and the repair of the continual waste of the body, in consequence of its incessant motion, and the action of surrounding matter, are proofs that it is constantly nourished.

\* Dr. GOORWIN, my ingenious friend, assures me that he has made experiments that render this common opinion doubtful.

The blood may be considered as the soil from which all the parts draw their nourishment; and accordingly it is diffused in the most perfect manner for this purpose.

It is little to be doubted, that every organ has a peculiar faculty of attracting from the blood that is sent to it those parts that are the most congenial and proper for its growth and repair, and perhaps of inducing in them a partial assimilation.

It is not determined by experiment which of the constituent parts of the blood is most efficient in nutrition; the coagulable lymph seems to be well calculated to adhere to the solids.

The immediate apposition of the nutritious matter in all probability depends on a peculiar attraction, or a plastic condition, the effect of organization; and therefore it may be called the plastic process, and is common to animals and vegetables.

It is obvious that the constancy of this process is essential to life, and its perfection, to health; and that its diminution is disease, and its interruption, for any considerable time, death; hence we discover the true object and limit of the healing art.

Notwithstanding the disputes of physiologists there is little reason to doubt that the extreme vessels, and not the nerves, are the channels that transmit the nourishment to every part of the system; the nerves indeed are in-



dispensable in so far as they give sensation and motion.

Thus we perceive the gradual manner in which assimilation proceeds; and that its great object is nutrition; and that it is entirely the operation of the solids; and that there is a congeniality between the fluids and solids essential to life and health; or, in other words, the blood that nourishes an animal must be the produce of its own vessels; and finally, the cause of the fatal effect of transfusing it from one to another.

As diet furnishes the materials for the plastic process, how manifest is it that the most important changes may be induced by dietetics, as to the cause and cure of disease! A fact of the last importance in medicine.

### *Secretion.*

The glands, however different in form, prepare matters more or less fluid from the blood; a function indispensably necessary to that of the other organs, and to life itself.

The matters secreted are

- 1 Useful,
- 2 Excrementitious.

The first serve some valuable purpose in the body; the latter, consisting of parts no longer useful, are ejected.

The

The principal secretions are,

- 1 Lymph,
- 2 Sebaceum,
- 3 Mucus,
- 4 Synovia,
- 5 Tears,
- 6 Saliva,
- 7 Cerumen,
- 8 Bile,
- 9 Pancreatic fluid,
- 10 Semen,
- 11 Milk,
- 12 Perspirable matter,
- 13 Mephitic matter,
- 14 Urine.

The modifications of the glandular structure, which produces such variety of effect, cannot be pointed out by anatomy.

Physiologists dispute much about the mode of secretion. While one contends that it is effected by the glands as strainers, another asserts that it depends on a changing power possessed by them: and indeed, as a general assimilation of the ingesta is performed by the vascular system at large, it does not seem to be absurd to conclude that a particular one should take place in particular glands, and give all the variety specified; on the contrary it is rather a beautiful idea, and much favoured by analogy: for instance, it must be a power of this sort that is the source of that  
endless

endless and extremely delightful variegation observable in many animal and vegetable substances, viz. feathers, flowers, &c.

---

### *Excretion.*

Excretion is that act of the excretories whereby the secreted matters are conveyed to their proper situations.

It will appear to be necessary that a balance should be maintained between the secreting and excreting organs, otherwise disease will ensue.

The motion of the fluids in the excreting ducts seems to arise from their contractility and from the vis aetrgo.

---

### *Absorption.*

The lymphatic and lacteal vessels perform absorption; hence they are commonly named absorbents.

These vessels, which are exceedingly numerous, originate from the cells, cavities, and surface of the system.

The lymphatics that begin from the surface are the only proper inlets to the system; hence food, &c. are transmitted through them, as appears by numberless facts.

The

The exhalant vessels, which seem to be arterial, are constantly discharging a lymph or halitus. From those that end in the surface the discharge is called insensible perspiration, and perspirable matter, and entirely escapes; while that emitted by those that open into cells and cavities is necessarily detained for various purposes, and would soon be accumulated to a hurtful degree, if not proportionally removed by the corresponding absorbents.

Thus it appears that there must constantly exist an equilibrium of action between the exhalants and absorbents, otherwise disease, particularly dropsy, general or local, ensues.

It is not easy to point out the structure of the absorbents, at the orifices, that enables them immediately to take in their fluids, nor the functions of the conglobate glands through which they pass. Their numerous valves are obviously calculated to prevent retrogression, which they do effectually. Therefore it is vain to attempt an explanation of morbid phenomena, from a supposition of a retrograde motion being possible, or rather taking place.

It is highly consequential in medicine to be well acquainted with the course of the absorbents

*Menstruation.*

*Menstruation.*

Menstruation is a periodical discharge of blood from the uterus.

This remarkable function of the female œconomy is entitled to special attention.

The interval between two consecutive menstruations is about twenty-seven or twenty-eight days; so that it occurs about thirteen times during the year.

The effused fluid is called catamenia, menses, menstrual discharge, because it is monthly; and, on account of its regularity and connection with health, it is very commonly named courses and flowers.

A small fluctuation as to the term is consistent with health.

The quantity, according to habit and other circumstances, is various; in general it amounts to six, eight, or ten ounces, and often much more.

The quality is healthful, and by no means vitiated.

Each menstruation endures from three to eight or ten days; so that it proceeds leisurely, like an oozing or exudation.

The time of life at which it first occurs, is much varied by climate and other causes.

In the southern latitudes it happens as early as the eleventh year.



In this and other northern countries it takes place about the fourteenth, and even eighteenth and twentieth year.

It is a mark of maturity.

The time of disappearance is as various as that of commencement: indeed both depend on the same primary causes; an early commencement and disappearance are connected.

It ceases in these climates about the forty-fifth or fiftieth year, with few exceptions.

It is suspended during pregnancy and suckling; if it occurs in the former, it may be regarded as disease (*menorrhagia catamenialis* \*).

The source is unquestionably the arteries which open on the surface of the lining membrane of the uterus.

These appear to be the same with or very analogous to the exhalant ones, so abundant on all other portions of the surface.

Some authors have supposed the menstruating vessels to be peculiar in their structure.

It is often preceded by

- 1 Lassitude,
- 2 Headach,
- 3 Pain,
- 4 Quick pulse &c.

It is difficult to point out that state of the vessels of the uterus which is its proximate cause.

\* PLENCK's Elem. Art. Obst.

§ FOSTER's Midwifery.

Plethora or fulness, is perhaps always much concerned.

To decide whether this be general or local, does not seem to be a point of much moment; for the difference is only that of a whole and a part.

It is exceedingly difficult to assign the occasional causes of the return, at intervals so surprisingly equal.

A reference to the change of the moon is not a proper solution of this question.

May they not be the same that give, in due season, the vegetation, flowering, &c. of plants?

The final cause seems to be, to preserve a condition of the uterus favourable to pregnancy; because, before its commencement, and after its disappearance, and even during any remarkable irregularity, pregnancy does not happen.

### *Generation,*

The generation of the foetus, is the most astonishing fact in natural history; accordingly, in every age, it has been a darling subject of philosophical research.

It is much to be regretted, that a just explanation of an event so interesting has not been obtained.

Generation

Generation comprehends

- 1 Conception,
- 2 Pregnancy.

Conception, or impregnation, is the immediate formation or vivification of the fœtus.

The principal conditions are,

- 1 Maturity,
- 2 Health,
- 3 Sexual commerce.

It seems to be certain, that conception is immediately transacted in the ovaria; these being the only feminal or proper genital organs on the part of the female.

The proofs are,

- 1 Turgescence of one or more vesicles,
- 2 Corpora lutea,
- 3 Fœtus in the ovarium.

The following theories have been proposed to shew the manner of conception.

- 1 A mixture of feminal fluids \*.

This is ingeniously abetted by the COUNT DE BUFFON, who supposes, that, in consequence of this mixture of the feminal matter, which he thinks abounds with organic molecules or living particles, derived from every part of the parents, the new system is organized ac-

\* HIPPOCRATES and other venerable ancients have favoured this doctrine.

cording to determinate laws of attraction, perhaps somewhat similar to crystallization \*.

2 One or more ova or eggs, formed and existing in the ovaria, are impregnated by one or more little animals (homunculi) in the male liquor §.

3 The rudiments of the foetus (germen, ebauche) exist in the ovaria, and are excited to life and evolution by the male fluid as a stimulus ||.

These hypotheses are not a little doubtful.

The first is the most agreeable to the idea of conception being the instantaneous effect of the sexual commerce.

The second, which presumes the existence of numerous animalcules in the male fluid, to one or more of which the ovum, furnished by the female, only affords a nidus or situation favourable to growth, is unsatisfactory; because, the generation of these animalcules remains to be explained.

The third, which is founded on a pre-existing germen, labours under the objection stated to the second: for the generation of the germen remains to be explained.

\* Histoire Naturelle, tom. ii. chap. iv. The Count has made many expensive and splendid experiments to illustrate his peculiar ideas: I shall be sorry if I have mistaken or distorted them.

§ LEWENHOEK, HARVEY, GRAAF, SWAMMERDAM, and others, favour this sentiment

|| M. M. VALISNERI, SPALANZANI, BONNET, &c. entertain this notion. See SPALANZANI'S Dissertations

The

The transference of parental likenesses, and even disease, are not sufficiently accounted for, on the supposition that the semen is a mere stimulus, and not a constituent matter.

Conception is an organizing act, perhaps depending ultimately on attraction; when, therefore, philosophy accounts for the astonishing variety of organization and its effects, we may reasonably expect some satisfactory theory of this important fact.

Although the human kind is uniparous, there is often a plurality of fœtuses.

The range is from two to five, the low numbers oftenest occur\*.

### *Pregnancy.*

Pregnancy, gravidity, or utero-gestation, is the existence of the fœtus in the cavity of the uterus.

The fœtus, formed in an ovarium, is generally transmitted by the uterine tubes to the uterus, to acquire due maturity.

It is not always thus transmitted, but remains in the ovarium, in a tube, or drops into the belly, and is extra-uterine.

\* HALLERI Physiolog. sect. DCCCCXXIX. Non raro femina geminos fetus parit; rarius paulo tres, neque unaquam supra quinque.



Sometimes, in consequence of rupture, it takes this last situation, after it has been lodged in a tube or the uterus.

The child is commonly carried in the uterus two hundred and eighty days, or nine solar months, otherwise a miscarriage or abortion is said to happen.

In this point a small latitude takes place.

Three theories are proposed to explain the nutrition of the foetus :

1 The liquor amnii swallowed and digested :

2 The mother's blood carried through continuous vessels :

3 The mother's fluids absorbed by the placenta.

The last accounts best for the phaenomena, and is supported by analogy.

1 The child lives after the liquor amnii is contaminated or discharged :

2 The headless foetus grows :

3 The child remains healthy, although the mother be considerably diseased :

4 Continuous vessels, of which none have been discovered, are not necessary \* :

5 The

\* I lately was requested to inject the vessels of a woman who died during parturition.

I made use of a solution of glue blended with vermilion, which many eminent anatomists think better calculated to enter the smaller vessels than most other compositions.

Upon

5 The chick in the egg is fed by absorption :

6 All animals are nourished by it after birth :

7 Vegetables suck their food from the soil and air :

8 Parasite plants absorb from others.

It is no improbable, that a small quantity of the liquor amnii is swallowed from time to time : it may have excellent effects.

The foetus thus appears not only to have the faculty of attracting its food from the uterus, but of assimilating and nutritiously applying it ; for it grows with astonishing rapidity, especially during early life \*.

Upon careful dissection, it appeared that not a particle of the injection had entered the vessels of the placenta or umbilical chord ; both which I examined attentively. Some clots of it were found between the uterus and the surface of the placenta.

This has been misrepresented to Dr. MONRO, because he quotes it as an instance of injection having passed into the placenta, and even the umbilical chord, in proof of continuous blood vessels which, he affirms, exist between the uterus and placenta, and are the channels of nourishment.

It is surprising that a gentleman of his superior understanding should so readily credit an unauthenticated narration : the keenness and ambition of system, which are sufficiently powerful to warp the judgment in most instances, can alone account for it.

A sacred regard for truth is the only motive that makes me advert to this matter. I might otherwise remain very well contented with the seeming honour of having succeeded better in the injecting art than any other anatomist I have ever conversed with, or heard of.

\* HALLERI Physiolog.

In

In general the blood circulates like that of the adult.

The chief peculiarities are,

1 Rate of motion, especially in the placenta, where it is exceedingly slow :

2 Transmission through the heart and lungs.

The food drawn from the mother is considerably animalized, and proportionally freed from excrementitious matter, and therefore affords but a small quantity of

1 Intestinal fæces or meconium ; none is ejected while in health :

2 Urine ; perhaps contained wholly in the bladder and the urachus ; the last is not continued to the placenta, nor to any alantois or cyst :

3 Sweat or perspirable matter ; this is blended with the liquor amnii, which perhaps is itself a secretion from the surface of the foetus :

4 Mephitic matter ; which returns to the mother \*.

Superfoetation is conception during pregnancy.

\* I have made three experiments on the human foetus, by tying the chord in two places, and opening the vessels between the ligatures, in order to discover if there be a difference of the colour of the blood in the veins and arteries, and found it more florid in the arteries than in the veins ; contrary to what has been supposed.-----See Dr. JEFFREY's Inaugural Dissert.

Its

Its possibility is admitted by respectable authority ||.

The superfoetus may be in,

- 1 The single and already gravid uterus :
- 2 The double one, previously gravid in one cavity :
- 3 The uterus, while another foetus is extra-uterine \*.

Much deception has taken place in this matter,

Monstrosity is an unusual conformation of the foetus.

Lusus naturæ, or deviations from the ordinary structure, which happily are rare, may be

- 1 Deficiency of head, mouth, ears, arms, &c.
- 2 Redundancy of head (*caput bicephalum*), trunk (*gemini concreti*), arms §, &c.
- 3 Obstruction

|| HALLERI *Physiolog* § DCCCCXXIX. Non dubium est, posse secundum fetum concepiti dum prior in utero est, &c.

\* PLENCK'S *Elem. Art. Obst.* p. 90

§ A bairn was born, reckoned to be a man-child; but, from the waste up, was two fair persons, with all members and portraiture pertaining to two bodies, two heads well-eyed, well-eared, and well-handed. The two bodies, the one's back was fast to the other's; but, from the waste down, they were but one personage, and could not know by the ingine of man, from which of the two bodies the legs and privy members proceeded. Notwithstanding the King's Majesty caused take great care and diligence upon the upbringing of two bodies in one personage, caused  
nourish

3 Obstruction of the rectum, &c. or anus imperforatus, &c.

4 Concretion

nourish them, and learn them to sing and play upon instruments of music; who, within short time became very ingenious and cunning in the art of music; whereby, they could play and sing two parts; the one on the treble, and the other on the tenor; which was very dulce and melodious to hear. The common people, who treated them also, wondered that they could speak diverse and sundry languages; that is to say, Latin, French, Italian, Spanish, Dutch, Danish, English, and Irish. Thir two bodies long continued, to the age of twenty-eight years; and the one departed long before the other, which was dolorous and heavy to the other; for which many required of the other to be merry. He answered, "How can I be merry, that have my true marrow as a dead carrion about my back, which was wont to sing and play with me. When I was sad, he would give me comfort, and I would do the like to him. But now I have nothing but dolour of bearing so heavy a burden, dead, cold, and unfavoury on my back, which taketh all earthly pleasure from me in this present life: therefore I pray to Almighty God, to deliver me out of this present life, that we may be laid and dissolved in the earth, wherefrom we came."

There was a bairn born which had both the kinds of male and female, called in our language a Scarcht, in whom man's nature did prevail; but becaue his disposition and portraiture represented a woman, in a man's house in Lintithgow, he associated in bedding with the goodman's daughter of the house, and made her to conceive a child. Which being devulgate through the country, and the matrons understanding this damsel deceived on this manner; and being offended that this monstrous beast should set himself forth for a woman, being a very man, they got him accused and convicted in judgment, for to be burnt quick for this shameful behaviour.--LINDSAY OF PITSCOTTIE's History of Scotland, p. 160, 164

A tradesman's wife at Robertsbridge in Suffex, was delivered of a child who had two heads, four thighs, four legs, and four feet, but only one body. Some small signs of life were discovered in one of the heads, which almost instantly vanished.

VAN



4 Concretion of the fingers, &c. or webbing, &c.

5 Malformation of the lip, foot, &c. hence hare-lip, club-foot, &c.

Till the generation of the perfect animal be accounted for, it must be highly absurd to offer any theory respecting monsters.

Referring them in any degree to the working of the mother's imagination, is not only ridiculous but pernicious; because they occur among brutes, birds, and other orders of animals, and even among vegetables.

### *Parturition.*

This is the expulsion of the mature fœtus from the uterus.

This event and its accidents are the grand objects of midwifery; here, however, they are to be considered merely in a physiological light.

Parturition is preceded by

- 1 A mucous discharge;
- 2 An irksome sensation about the os internum;

VAN DOVERN has written a Treatise on monsters of various kinds.

WALTER has published a dissection of the double fœtus.  
---See Observat. Anatom.

Dr. MONRO has done the same.-- See Nervous System.

- 3 Altered shape of the belly ;
- 4 Membranous state of the os internum ;
- 5 Dilatation of the os internum ;
- 6 Laxity of the vagina and os externum.

It is attended with

- 1 Pains in the loins and adjacent parts, increasing at intervals ;
- 2 Tenesmus, or downward pressure, accompanying the pain, and proportioned to it ;
- 3 Tension of the belly, and retention of the breath, during the pain ;
- 4 Diffused pain about the pelvis when the body is moved ;
- 5 Desire to void the urine and fæces, even when there is no accumulation ;
- 6 Dilatation of the os internum, increased during a pain, so that the chorion may be felt.

Pains not of this description are called false (*dolores spurii*).

When true and false concur, they are mixed pains (*dolores mixti*).

Parturition takes place with wonderful exactness at the expiration of the term of pregnancy, notwithstanding the very different sizes of mothers and children.

A degree of variation is sometimes to be marked \*. An anticipation is premature birth

\* HALLERI *Physiol.* §. DCCCCXXVII. *Tempus partus nonio solaribus mensibus emensis ingruit, in omnibus animalibus perinde definitum, etsi aliquot septimanis per suas causas, aut accelerari potest, aut retardari, &c.*

(partus præmaturus). A protraction is post-mature delivery (partus serotinus)\*. The exciting cause is unquestionably an irritation often depending on distension; in consequence of which the respiratory and abdominal muscles are thrown into strong action, whereby the uterus is compressed, and the os internum distended: this constitutes and is called a labour-pain or throe.

The pain, strictly speaking, which occasions the complaining or crying, is the effect of the distension.

The contractility of the uterus, comparatively weak, is not so efficient as has been commonly supposed §; and does not by any means resemble muscular action ||.

The labour-pains become more and more frequent and strong, propel the head or other part of the child toward the os internum.

The membranes, especially during a pain, become tense, like a bladder filled with water; and protruded through the os internum, now considerably enlarged. Unsupported at this point, they burst, and the liquor amnii is suddenly discharged; an event called by the women the breaking of the waters.

\* PLENCK's Elem. Art. Obst.

§ HALLERI Physiolog. § DCCCXXVII. Uterus contractili vi fœtum constrictus urget, qui solus etiam absque nixu matris, fœtum non-nunquam expellit.

|| See Dr. J. G. WALTER's Treatise de Morbis Peritonæi.

The pains increase for the most part after the rupture of the membranes; because the head, which is the part commonly presented, is more closely applied to the os internum, and thus gives more irritation than formerly.

The head, with its vertex undermost, and the face turned to the mother's side, passes the brim of the pelvis, when it is said to be in the bones, and shivering fits frequently ensue.

The resistance at the posterior part, and sides of the pelvis, on account of the depth, turns the vertex towards the os externum, and the face towards the cavity of the os sacrum.

The vertex soon distends the os externum and perinæum, like a great tumour, so that the anus is dilated, and the rectum emptied: it then moves forwards and upwards, and the face emerges from the perinæum as from behind a large valve, and the head is born.

The mother's cries, during this event, are exceedingly strong, and expressive of the rack-ing anguish she suffers.

The trunk and limbs, in consequence of the preceding contraction, are soon expelled.

The child is entirely passive during parturition; consequently it is as readily born when dead, as when alive.

About a pound of blood is suddenly discharged after the expulsion of the child, which seems to have been gradually poured out

out from the uterine vessels during the latter part of the process.

Parturition is not completed till the after-birth be discharged, because it is a part of the foetal system.

The placenta, already somewhat disengaged, before the child be expelled, is gradually loosened entirely, and thrown off by the uterine contraction chiefly.

This is effected with various expedition; most commonly within an hour or two; and is succeeded by a discharge of blood, often exceeding the quantity formerly effused.

This hæmorrhage gradually subsides, and for the most part disappears within two or three days: it is termed lochia, and lochial flux.

Parturition is commonly finished within twelve hours, a day, or a day and a half; it is rather tedious, if it be protracted through two days.

When the lochial flux has abated, the breasts begin to be more or less painful, hard, and swollen, and sometimes fever (febris lactea) succeeds.

These effects result from the change of the milk glands, now proceeding rapidly in their proper function.

*Respiration.*



*Respiration.*

Respiration or breathing is one of the most important functions, and in general essential to the living condition after birth.

In consequence of the thorax being enlarged by the contraction of the intercostal muscles and diaphragm, a portion of atmospheric air rushes into the bronchial tubes, that collectively may be considered as an empty bladder placed in a vacuum. This is called inspiration.

The muscles dilating the thorax ceasing to act, and those contracting it making an exertion, assisted by the reaction of the cartilages and ligaments of the ribs, it recovers its unconstrained disposition, and as much air is expelled as had been taken in during the preceding inspiration. This is termed expiration\*.

The alternate succession of inspiration and expiration is named respiration.

The lungs of the fœtus are comparatively dense, and of small volume, and seemingly do not fill the pleuritic cavities till respiration commence; when the circumambient air,

\* Dr. GOODWIN has proposed an accurate method of weighing and ascertaining the quantity of air inspired, and has published an elegant design of the balance employed. See Inaugural Dissertat. de Merbo mortique submorforum investigandis.

by its pressure, insinuates itself and gives such distension as carries the pulmonary and costal pleuræ into mutual contact. A sufficient quantity of air for this purpose is always present in the healthful lungs, which, in the full-sized adult, amounts to 262 cubic inches. When inspiration takes place 6 cubic inches of additional air is inhaled, and thus the whole is equal to 268 inches: a calculation that admits of variation from size \*, &c.

Respiration favours,

1 The circulation of the blood through the lungs: the dilatation which they attain unquestionably facilitates the transmission of the blood, although experiments shew it is not essentially necessary;

2 The diminution of animal heat:

3 The discharge of vapour or halitus, which seems to be emitted by exhalant vessels similar to those in the cutaneous surface, by which the perspirable matter escapes:

4 The abstraction of fixed or mephitic air, for which there are perhaps peculiar secreting vessels on the surface of the vesicles:

5 The introduction of pure or dephlogisticated air, which is essential to the vital condition,

It is now generally admitted, that atmospheric air is an heterogeneous or mixed body: a hundred parts of it contains of

\* See Dr. GOODWIN's Inaugural Dissertations, already quoted.

	Parts.
Phlogisticated air	80
Pure air,	18
Fixed air,	2
	-----
	100

When this is expired the proportion and quantity are varied thus :

Phlogisticated air,	80
Pure air,	5
Fixed air,	13
	-----
	98

The florid colour which the blood acquires in the lungs, and retains in the arteries, is communicated entirely by this pure air, which may almost be considered as the fuel of the vital flame ; for life languishes when this is withheld, as in drowning, hanging \*, &c.

It may be observed, that the effect of this pure air may perhaps be somewhat ascribed to its preventing the fixed air, which seems to be highly deleterious, from injuring the system.

### *Animal Heat.*

Animals in general possess a temperature superior to that of the surrounding atmosphere, which is called animal heat.

\* Dr. GOODWIN's Dissertation, p. 40.

The large animals whose blood is red, have a temperature equal to 96 degrees of FARENHEIT'S thermometer, with little variation; which is considerably above the ordinary state of the atmosphere.

The source of animal heat is a subject of much physiological dispute. While one physiologist ascribes it to friction of the fluids on their vessels, another contends that it is phlogiston evolved from the fluids by vascular action.

As to the first opinion, facts are wanting to shew that a friction can take place between fluids and solids capable to produce heat; and the second is exceedingly doubtful, as nothing fixed with regard to phlogiston is yet determined by the chemists.

Many reasons may be alledged to make it probable that animal heat is derived from the air in the lungs, or from the atmosphere, perhaps in consequence of a chemical action between the blood and the air. Thus it is contended, that the blood gives out phlogiston, which unites with air so as to expel its fire, and that this is attracted by the blood, in consequence of superior affinity; or, in other words, a double elective attraction is continually going on, connected with respiration, or any analogous action in animals.

\* See CRAWFORD on Animal Heat.

It must be admitted that this theory is exceedingly beautiful, and a good deal supported by the consideration of the mutual action of elementary bodies on one another so generally observable. Much information, however, is as yet wanted on this point.

Whatever be the cause of animal heat, one circumstance is most certain, viz. that it is very generally proportioned to vascular action; hence its increase during exertion, and many diseases, such as fever.

It has lately been observed, that Nature has endowed animals with the a power of resisting heat; as it appears that life can be supported in a temperature of the air considerably beyond the boiling point. Perhaps evaporation is much concerned in this remarkable phenomenon, on which the preservation of life may often depend.

T H E E N D.



## EXPLANATION OF THE TABLES.

### TABLE G G.

A view of the Base of the Sensorium Commune, with its Nerves, Arteries, &c.---by  
HALLER.

AA Anterior lobes of the cerebrum.

B The interstice between these lobes.

CC Middle lobes of the cerebrum.

The exterior lamina of the pia mater is cut, and the right middle lobe kept backwards by a probe, to shew the deep division between it and the anterior lobe, named fissura SYLVII, containing the middle arteries of the brain.

DD Extremities of the posterior lobes of the brain, projecting beyond the cerebellum.

EE Lobes of the cerebellum, with their concentric arches.

FF Lateral or lobular portions of the pons VAROLII, or tuber annulare.

G Cauda medullæ oblongatæ, with its protuberances.

H Infundibulum, leading from the third ventricle.

### *Nerves.*

1 1 The processus mamillares, or trunks of the olfactory or first pair of nerves, running forward under the anterior lobes of the brain to reach their proper holes in the ethmoid bone.

## EXPLANATION OF THE TABLES.

2 2 The trunks of the second pair, or optic nerves, uniting and then diverging to fall into the optic holes, on their way to the orbits and eye-balls.

3 3 The trunks of the third pair of nerves, or motorii oculorum, stretching to the superior obitar fissures.

4 4 The trunks of the fourth pair of nerves, or trochleatores, taking the same course with the former.

5 5 The trunks of the fifth pair, or trigemini.

6 6 The trunks of the sixth pair, or abducetes.

7 7 The trunks of the seventh pair, or auditory nerves (portio mollis & dura) going to the meatus auditorii interni.

8 8 The trunks of the eighth pair of nerves, or par vagum, tending to the holes common to them and the lateral sinusses.

9 9 The trunks of the ninth pair of nerves, or linguales, pointing to their holes in the occipital bone, above the condyles, to reach the tongue.

10 10 The trunks of the tenth pair, that go out under the base of the occipital bone by the spinal hole.

### *Arteries.*

a a Trunks of the internal carotids as they arise by the sides of the sella turcica, immediately below the optic nerves.

b b Anterior

## EXPLANATION OF THE PLATES.

b b Anterior anastomosing branches.

c c Posterior anastomosing branches.

d d Trunks of the vertebral arteries as they enter the skull by the occipital hole.

e e Arteria basilaris, formed by the union of the vertebrals lying in the groove of the tuber annulare, sending off many lateral branches to the medulla oblongata, cerebellum, &c.

f f Anastomosing branches between the arteria basilaris and the the posterior ones of the carotids.

b a c f f c a b Circus arteriosus WILLISII, or arterial circle of WILLIS, formed by the anastomosing branches of the carotids and vertebrals, from the outside of which the following branches go off:

g g Anterior branches that enter between the anterior lobes, and are dispersed to both hemispheres, reaching to their upper parts;

h h Middle or lateral branches that run along the Sylvian fissures to the adjacent parts.

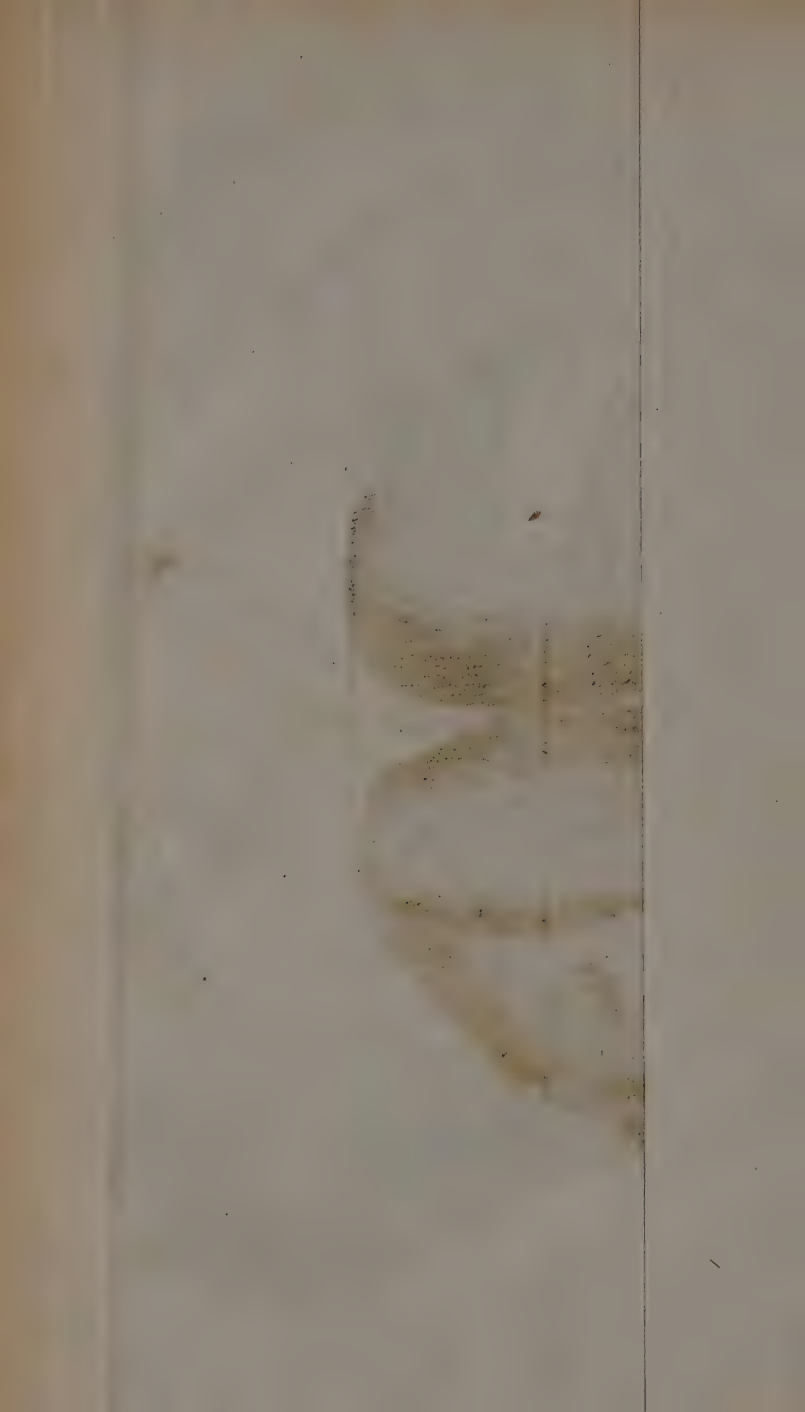
i i Posterior branches that are distributed between the posterior lobes and the cerebellum.











## EXPLANATION OF THE TABLES.

### TABLE HH.

#### A View of a transverse Section of the Brain

---by HALLER.

AA The cortical or cineritious part, every where on the outside of the

BB, &c. Medullary substance.

C Division between the anterior lobes.

DD Anterior arteries.

EE Lateral ventricles.

F Fornix turned forward.

GG Anterior pillars

HH Posterior pillars

} of the fornix.

II Corpora striata in the anterior part of the ventricles,

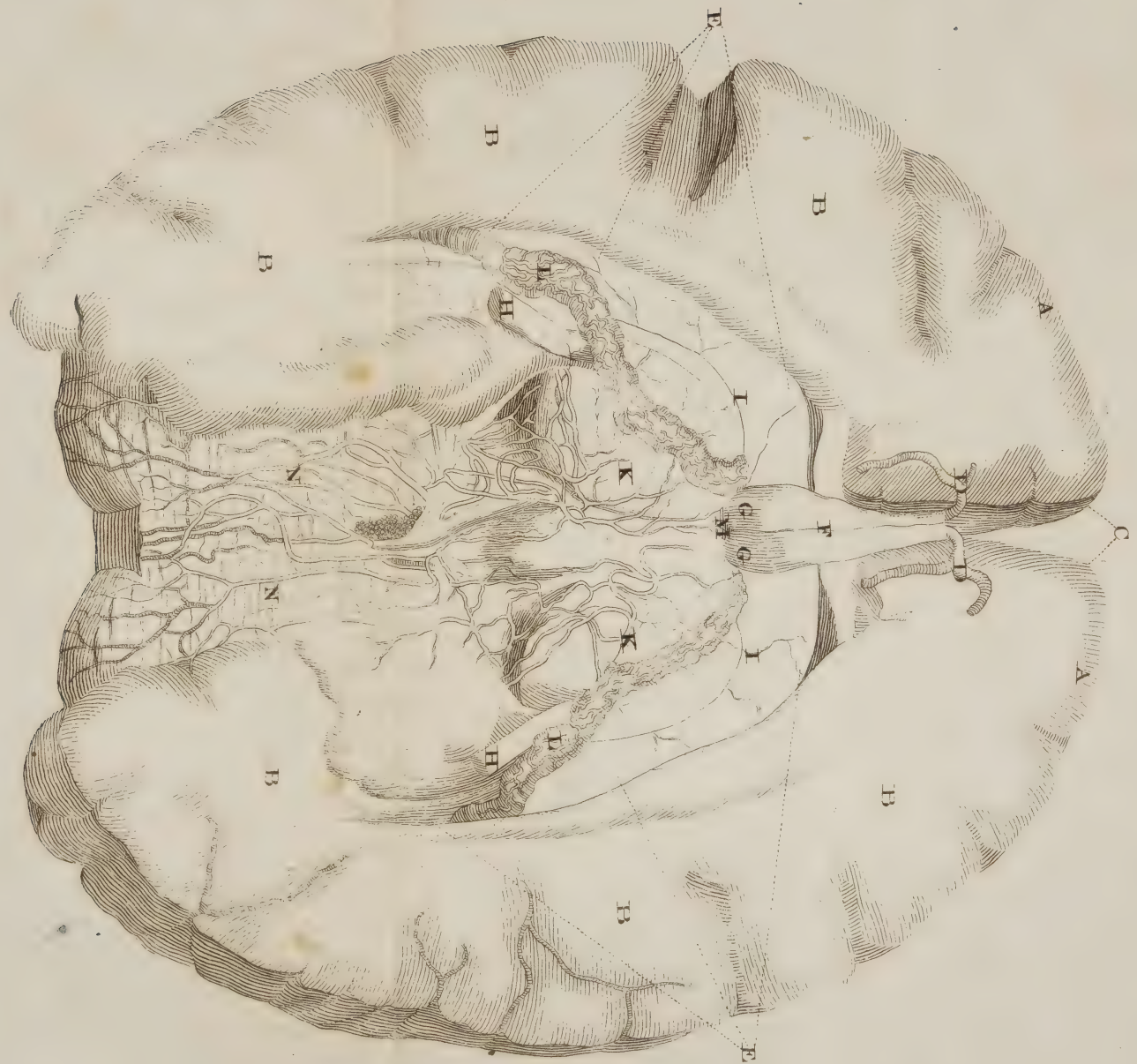
KK Thalami of the optic nerves.

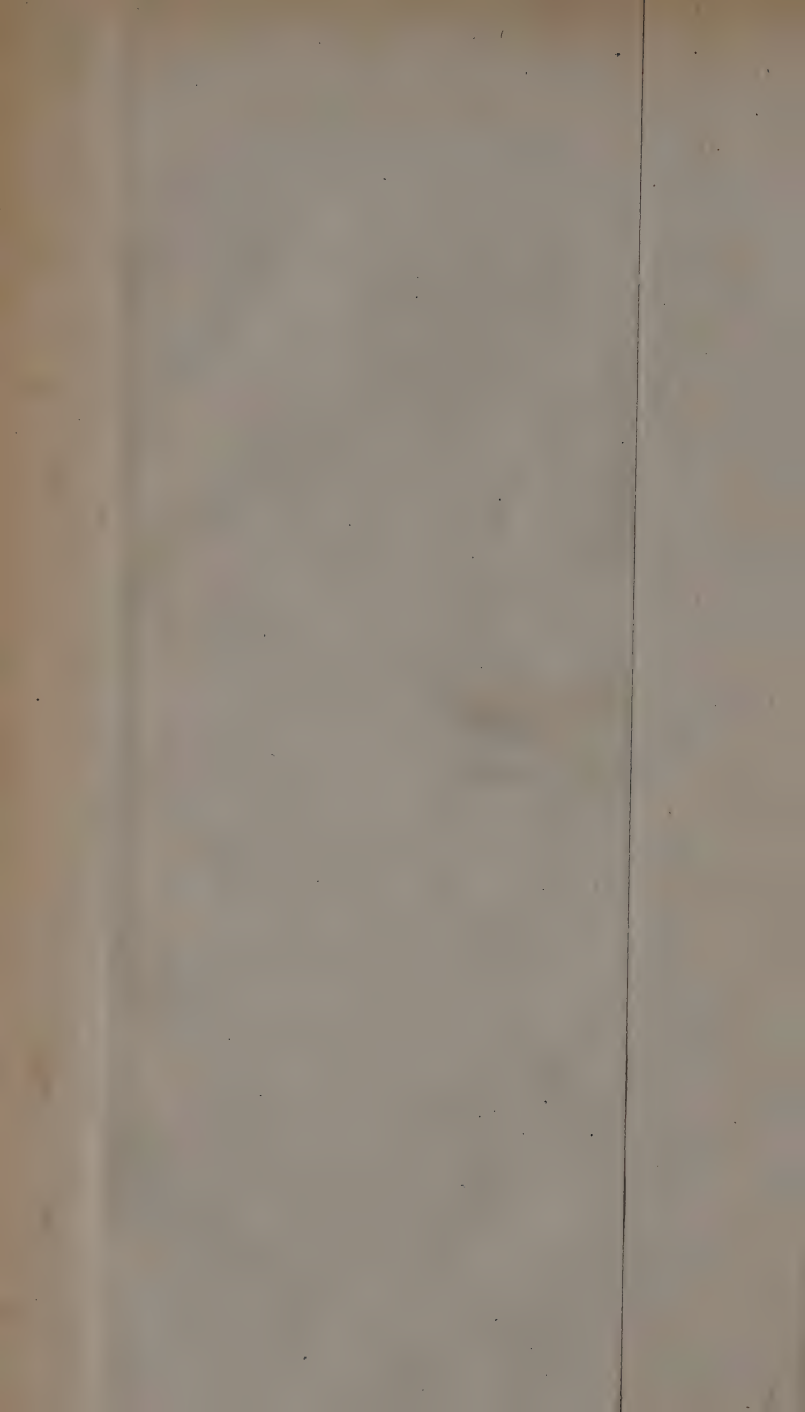
LL Plexus choroidæi, which communicate through the opening or hole M.

NN Part of the superior surface of the cerebellum covered with the pia mater, carrying many blood vessels.

TABLE









## EXPLANATION OF THE TABLES.

### TABLE II.

**A** View of a transverse Section of the Brain, in a deeper point than the former one---by HALLER.

**A A A**, &c. The cortical substance.

**B B**, &c. The medullary substance.

**C** A point corresponding to the third ventricle.

**D** The pineal gland, lying between the four tubercles, viz. the nates and testes.

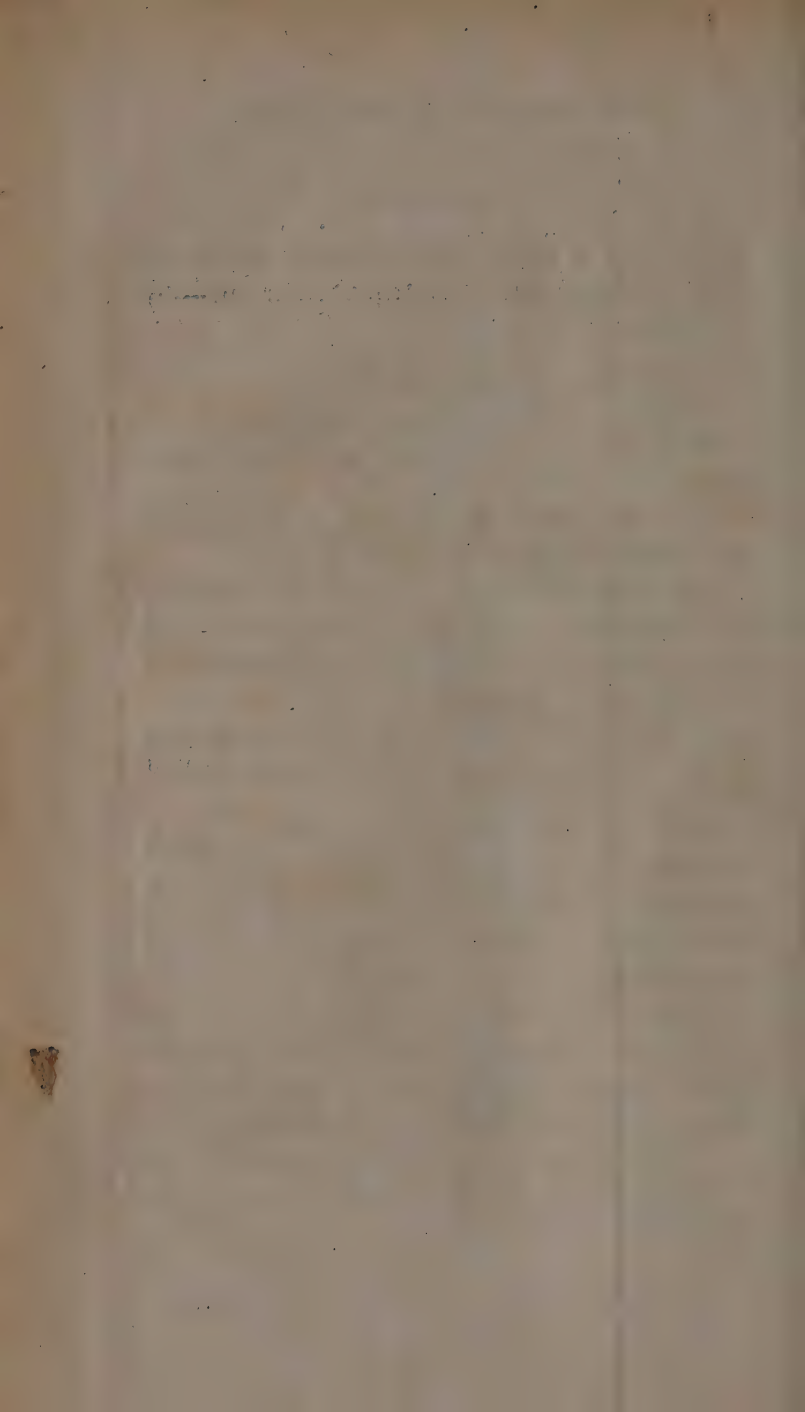
**E E** The lobes of the cerebellum, consisting of concentric arches, that correspond to the convolutions of the cerebrum, drawn aside in consequence of an incision.

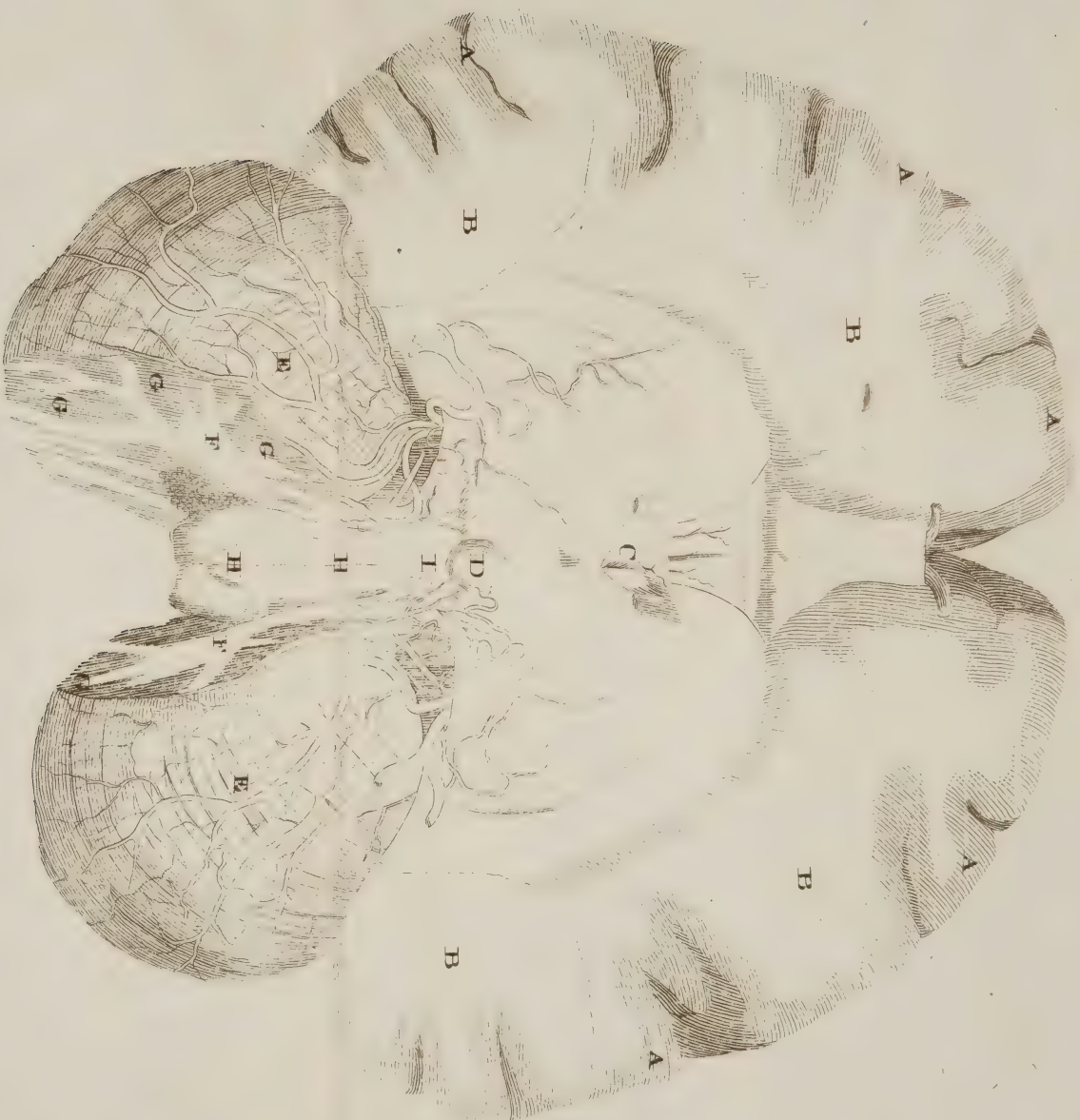
**F** Medullary substance of the cerebellum that resembles a tree with foliage, called therefore *arbor vitæ*.

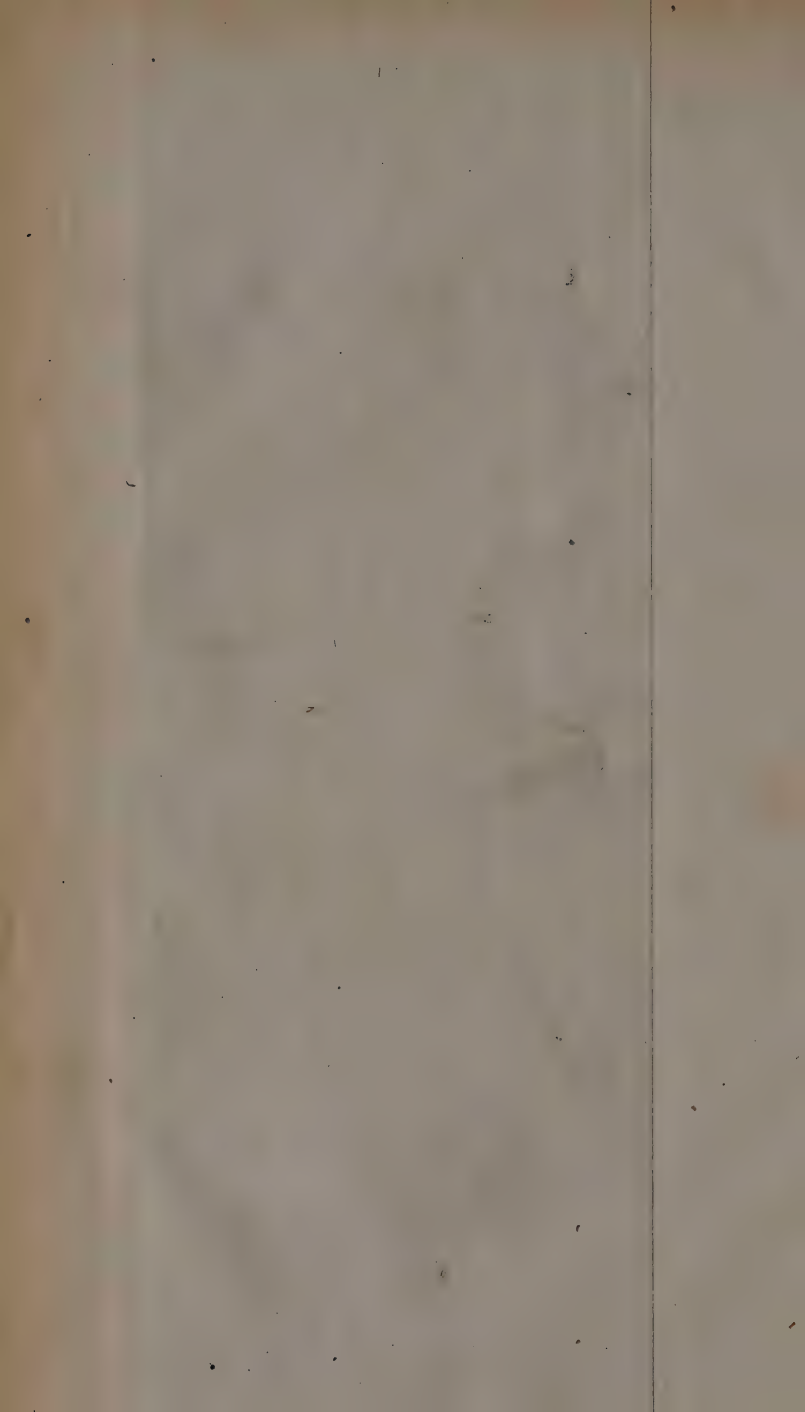
**G G**, &c. The cortical part, which is much extended by the foliated disposition of the medullary substance; a circumstance that has either been overlooked or slightly described by anatomists.

**H H** The fourth ventricle cut open from above. It communicates with the third one under the pineal gland, by what is called the *Iter a tertio ad quartum ventriculum*.

**I** The superior part of the medulla oblongata, which, like an isthmus, connects the cerebrum and cerebellum.







## EXPLANATION OF THE TABLES.

### TABLE KK.

#### A View of a perpendicular Section of the Head---by MONRO.

A A The cranium.

B Part of the frontal sinus.

C Part of the left sphenoidal sinus.

D The nasal lamella of the ethmoidal bone.

E The vomer.

F The cartilaginous part of the septum.

G The opening from the right nostril into the throat.

H The palatal process of the right maxillary bone, with the alveolar one carrying the teeth.

I I The cancellated portion of the cuneiform process of the occipital bone, and body of the sphenoidal one very abundant.

L L L The root of the falx, the rest being removed to shew the convolutions on the inner side of the right hemisphere of the brain.

M M Part of the tentorium cerebello superius, carrying the sinus named torcular HEROPHILI.

N N The corpus callosum.

O The septum lucidum.

P The body of the fornix.

Q Q The two anterior crura of the fornix.

R Commissura cerebri anterior.

P

S The



## EXPLANATION OF THE TABLES.

S The passage by which the lateral ventricles of the brain communicate with each other, and with the third ventricle.

T Right surface of the third ventricle.

U Infundibulum, beginning from the third ventricle.

V The glandula pituitaria in the sella turcica.

W Left optic nerve.

X Left tuberculum albicans, behind the infundibulum.

Y Part of the choroid plexus.

Z The pineal gland, with two peduncles, one connecting it with the side of the third ventricle, and the other to the commissura cerebri posterior a.

b The iter ad quartum ventriculum.

c d Left natis and testis.

e The valvula *Vieussenii*.

f The arbor vitæ cerebelli.

g The cavity of the fourth ventricle.

h The cavity of the fourth ventricle, shut by the choroid plexus and pia mater.

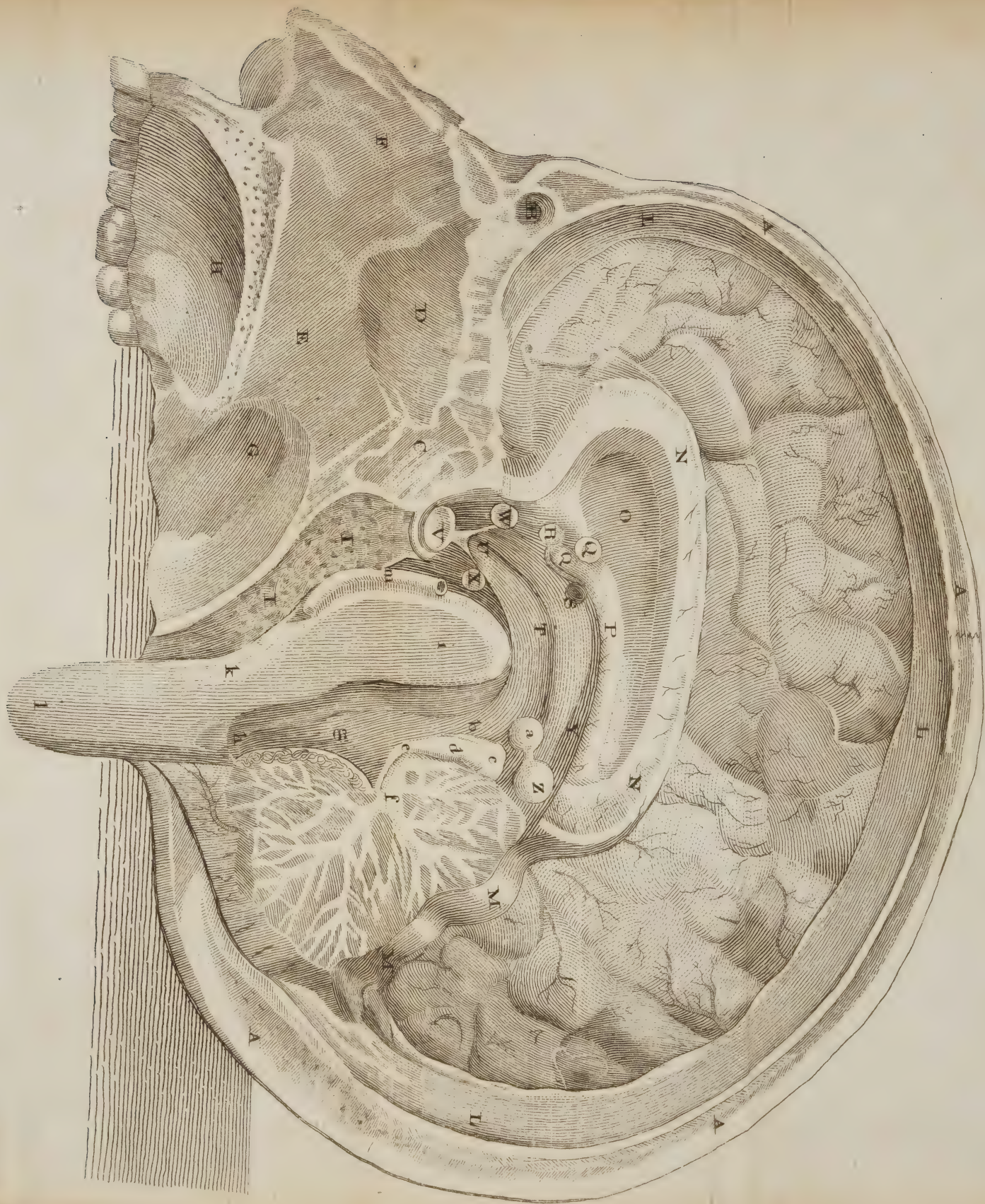
i Tuber annulare.

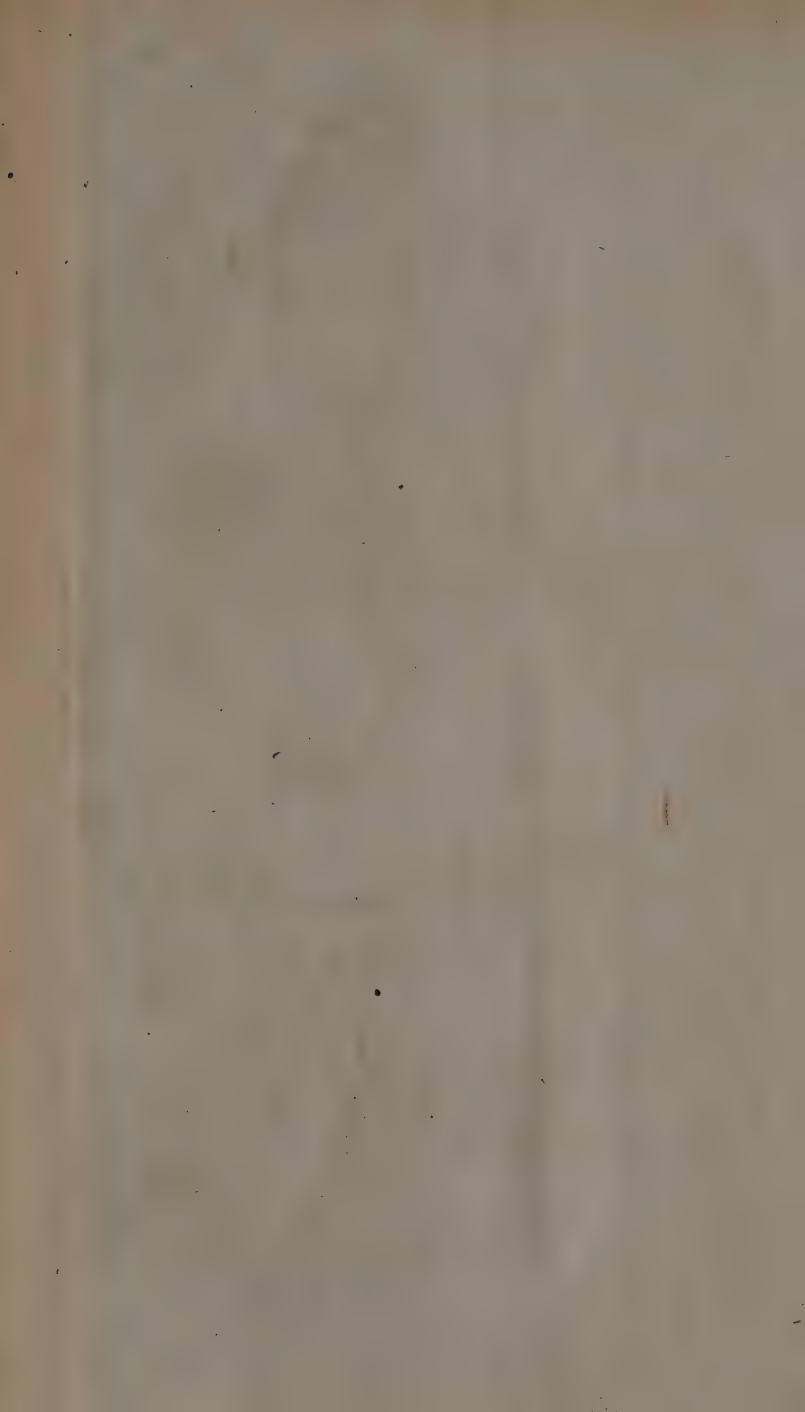
k The cauda of the medulla oblongata.

l Upper part or beginning of the spinal marrow.

m Arteria basilaris.









## EXPLANATION OF THE TABLES.

### TABLE LL.

**A** View of the internal Surface of the Base of the recent Skull, covered by the Dura Mater; containing Sinusses, Nerves, &c.--by HALLER.

**AA** The frontal sinusses.

**BB** The eye-balls; the upper part of the orbits being removed.

**C** A part of the tentorium cerebelli, containing the torcular HEROPHILI ending in the lateral sinusses.

**D** Lowest part of the superior longitudinal sinus, ending in the lateral ones by a bifurcation.

**EE** Lateral sinusses receiving veins *eee*, in their course.

**FF** Cavernous sinusses cut open.

**G** Sella turcica, containing the glandula pituitaria.

**H** Top of the spinal marrow appearing through the occipital hole.

**I** Falx cerebelli, adhering to the inferior part of the vertical spine of the occipital bone.

**KK** Trunks of the carotids as they arise by the sides of the sella turcica, immediately behind the optic nerves.

**LL** Arteries of the dura mater derived from the external carotids.

## EXPLANATION OF THE TABLES.

### *Nerves.*

1 1 Filaments of the first or olfactory pair, passing downwards in the holes of the cribriform lamella of the ethmoidal bone to be spread in the nose.

2 2 Trunks of the second pair or optic, entering their proper holes to reach the bottom of the orbits in their way to the posterior surface of the eye-balls.

3 3 Trunks of the third pair, or motorii oculorum, running through the cavernous sinusses, principally to muscles of the eye-balls.

4 4 Trunks of the fourth pair, very small, passing through the cavernous sinusses to the trochleares muscles chiefly.

5 5 Trunks of the fifth pair, large, passing into the cavernous sinusses, in which each is divided into three branches, hence named trigimini, which go to the orbit, the upper and under jaws, respectively through their proper holes.

6 6 Trunks of the sixth pair, entering the dura mater, behind the sella turcica, to reach the cavernous sinusses and orbits.

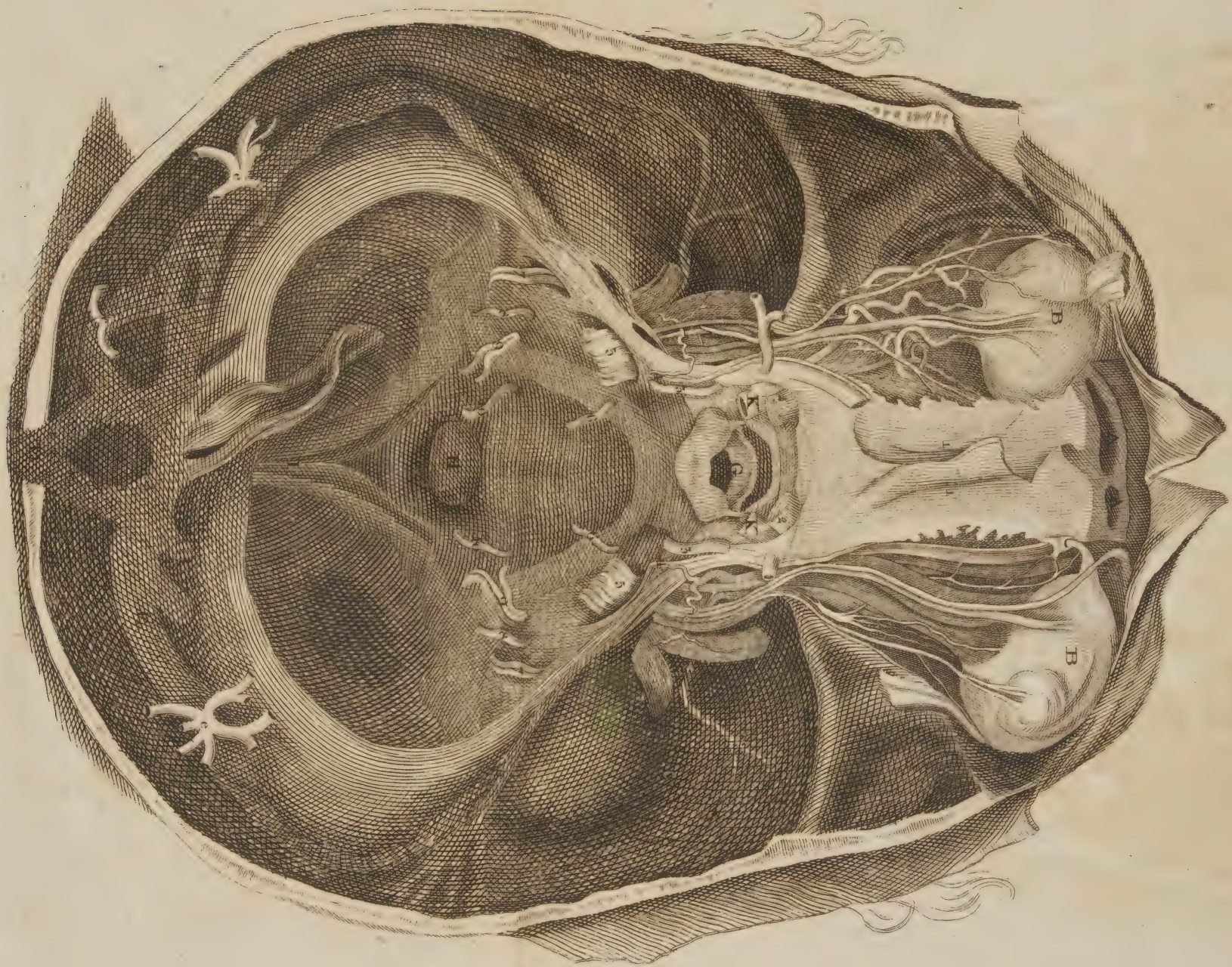
7 7 Trunks of the seventh pair, or auditory nerves, entering the meatus auditorii interni; each is double, consisting of portio mollis and dura.

9 9 Trunks of the ninth pair, or hypoglossal nerves.

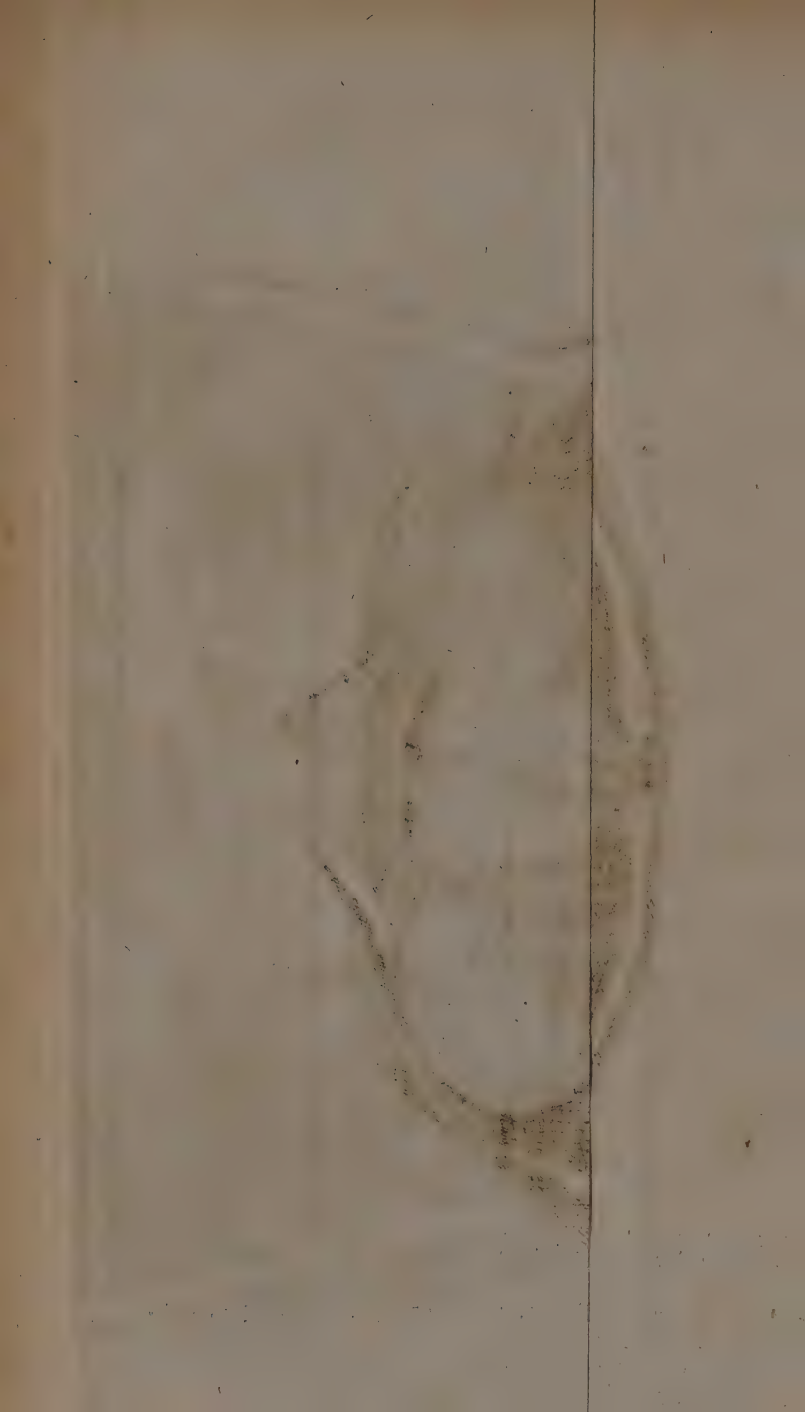
10 10 Trunks of the tenth pair.

TABLE









## EXPLANATION OF THE TABLES.

### TABLE LLL.

A View of the Veins of the Dura Mater, in situ---by Dr. WALTER, sen.

#### FIG. I.

Represents the upper Segment of the Dura Mater adhering to the corresponding Segment of the Skull.

AAAA The edge of the skull.

BB The falx of the dura mater.

CCCC The veins of the dura mater, some of them running to the superior longitudinal sinus, and others to the base of the skull.

#### FIG. II.

Represents the Base of the Skull with its Dura Mater in Situ.

AA Tentorium cerebelli, or septum duræ matris.

B The line from which the posterior extremity of the falx is cut.

CCCC The veins passing to the principal sinusses of the dura mater; many of which are likewise called sinusses.



## EXPLANATION OF THE TABLES,

### TABLE MM.

Views of the Eye-ball, its Vessels, Muscles, &c.  
---by HALLER, ALBINUS, and others.

#### FIG. I.

A View of the external Vessels of the Eye; to obtain which the Integuments and a considerable share of the Orbicularis Muscle are removed.

The principal branches are derived from the angular vessels, while a general anastomosis takes place with those of the forehead, temple, and cheek, and the opening of the lids is surrounded with a kind of circle, like that of the mouth.

#### FIG. II.

A View of the upper side of the Eye-ball and its parts, obtained by removing the superior Segment of the Orbit, the Levator Palpebræ, and Rectus superior Muscle.

- A Optic nerve, somewhat curved.
- B Musculus trochlearis.
- C Lachrymal gland.
- D Tarsus superior.

Fig.



## EXPLANATION OF THE PLATES.

### FIG. III.

**A** View of the inferior Vessels of the Eye-ball; to obtain this it is drawn very much aside.

**A** The optic nerve.

**B** The opaque cornea, or sclerotic coat of the eye-ball, freed from muscles, &c,

**C** The lucid cornea, or sclerotis.

**D** The rectus inferior muscle.

**E** The obliquus minor muscle.

### FIG. IV.

**A** View of the Eye-ball, after the outer Coat or Sclerotis is partly detached and turned off.

**A A** The opaque sclerotis, partly detached by dissection.

**B B** Posterior and anterior portions, entire.

**C** Lucid cornea, and part of the pupil appearing through it.

**D D** The choroid coat, with numerous vessels beautifully anastomosing on its surface.

### FIG. V.

**A** View of the Eye-ball, entirely deprived of the opaque and livid Cornea, and consequently of the exterior Surface of the choroid Coat, Uvea, and Pupil, with their Vessels.

**A A** Ciliary circle or ligament (orbiculus ciliaris, or ligamentum ciliare) to which the  
anterior

## EXPLANATION OF THE TABLES,

anterior part of the opaque cornea slightly adheres.

B The uvea, or iris, or that part of the choroid coat situated before the ciliary ligament, containing the circular hole called the pupil.

C C Vasa vorticosa, so named from the manner of their dispersion.

### FIG. VI.

A front View of the Eye-ball, from which the lucid Cornea is removed, to shew the Iris, the Pupil, and the disposition of the Vessels.

### FIG. VII.

A side View of the Eye-ball, from the sclerotic and choroid Coats are partly removed or turned off, to shew the Retina and the dispersion of the central Artery on it.

### FIG. VIII.

A View of the Eye-ball, nearly the same as in Figure 7.

A Ciliary processes on the superior surface of the uvea, near the root.

B Retina, with its vessels including the vitreous humour and its capsule.

C The crystalline humour or lens covered with its capsule.

FIG.

## EXPLANATION OF THE TABLES.

### FIG. IX.

**A** View of the Eye-ball magnified, from which the opaque and lucid Corneæ have been removed, to shew the choroid Coat, Uvea, and Pupil with the beautiful distribution of the Blood-vessels---by MEYERS.

**A A** Part of the opaque sclerotis.

**B B** Vasa vorticosa on the exterior surface of the choroid coat, anastomosing with one another, and with those of the uvea, the last of which are continued over

**C** The pupil, to shew their distribution on the membrana pupillaris of the foetus, which fills up the pupil.

### FIG. X.

**A** View of the Eye-ball and its Muscles---by ALBINUS.

**A A** The eye-ball.

**B** The optic nerve.

**C** Levator palpebræ superioris.

**D** Rectus superior.

**E** Trochlearis, within which a little of the rectus internus is seen.

FIG.

## EXPLANATION OF THE TABLES,

### FIG. XI.

A View of the Eye-ball deprived of some of its Muscles.

A The eye-ball.

B The optic nerve.

C Rectus internus.

D Rectus externus.

The rectus inferior somewhat appears below the optic nerve.

### FIG. XII.

A View of the Eye-ball and all its Muscles.

A The eye-ball.

B The optic nerve.

C The trochlearis, with its tendon transmitted through the trochlea.

D Obliquus minor.

### FIG. XIII.

A View of an horizontal Section of the Eye-ball, to shew the Disposition of the Coats and Humours---by LE CAT.

A A Opaque cornea.

B B Lucid cornea.

C C Choroid coat.

c c Uvea.

D Pupilla.

E E Retina.

Q

F Trunk

## EXPLANATION OF THE TABLES.

**F** Trunk of the optic nerve with its coats, of which those of the eye-ball are represented as continuous.

**f** Insensible point from which the retina is expanded.

**G** Vitreous humour contained in its capsule.

**H** CrySTALLINE humour or lens, contained in its capsule, between the anterior surface of which, and the posterior one of the uvea, is a space called posterior chamber of the aqueous humour; and the space before the iris is anterior chamber of the same humour; because this humour possesses both.

### FIG. XIV.

Shews how the image of an object, **A**, is inverted, **B**, by the rays being refracted by the lens, **C**, and consequently the disposition of the picture of an object on the retina.

### FIG. XV.

Shews how a pencil of rays is refracted by the humours of the eye, so as to have its focus fall on the retina.





Fig. 3.

Fig. 7.

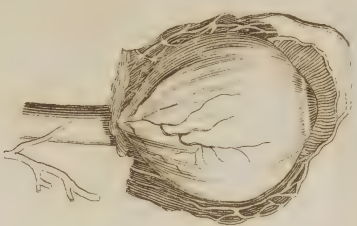


Fig. 9.

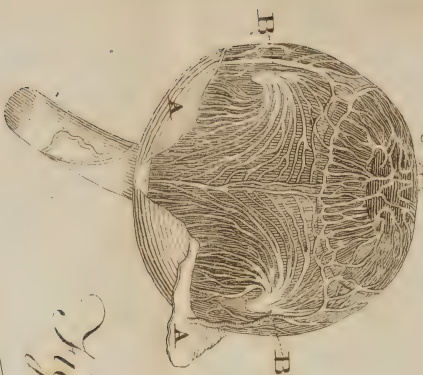


Fig. 13.

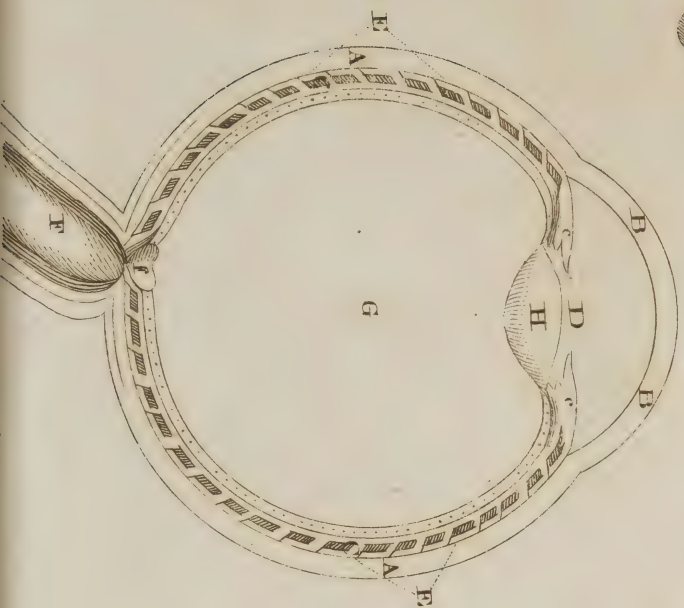


Fig. 2.

Fig. 6.



Fig. 10.

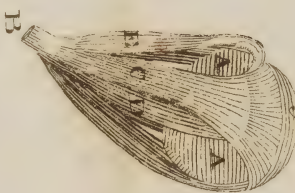


Fig. 11.

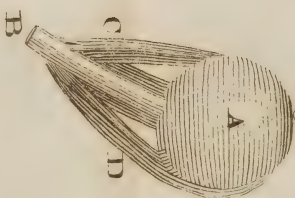


Fig. 12.



Fig.

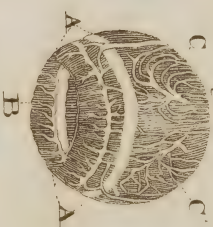


Fig. 5.

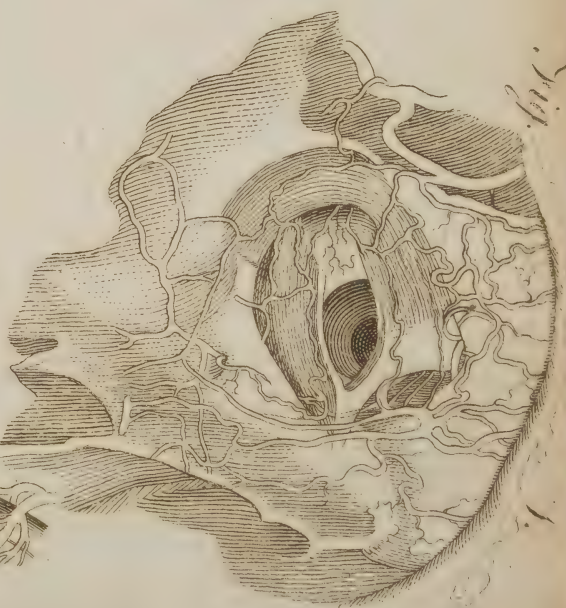


Fig. 1.

Fig. 14.

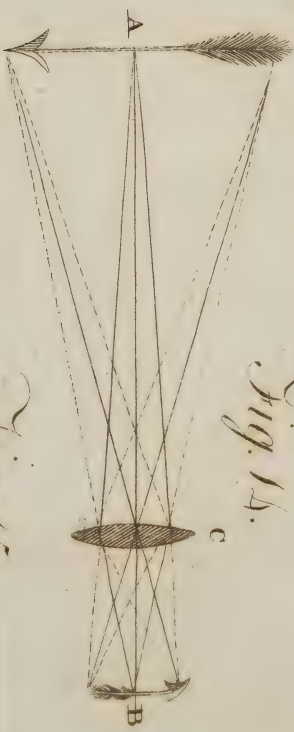
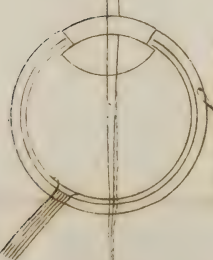


Fig. 15.





## EXPLANATION OF THE TABLES,

### TABLE NN.

A View of the cutaneous Vessels, &c. of the left superior Extremity, from which the Integuments have been removed---by CAMPER.

#### FIG. I.

#### *Muscles.*

- A Pectoralis major.
- B Deltoides.
- C Latissimus dorsi.
- D Biceps flexor cubiti.
- d d Round tendon of the biceps, with its aponeurosis extended to the inside of the forearm, concealing all the parts except the superficial veins.
- E Triceps extensor cubiti.
- F Pronator teres.
- G Supinator radii longus.

#### *Artery and Veins.*

- a Brachial artery, appearing near the inner edge of the tendon of the biceps, where it may always be felt.
- b Basilic vein, near the internal condyle.
- c Cephalic vein, near the external condyle.
- d Median vein, near the middle of the arm.
- e Median basilic vein.
- f Median cephalic vein.



## EXPLANATION OF THE TABLES.

g Deep-seated vein, accompanying the artery, and closely attached to it.

### *Nerves.*

- 1 Axillary branch from the brachial plexus.
- 2 2 2 Cutaneous nerve.
- 3 3 3 Musculo-cutaneous nerve.

### FIG. II.

### *Muscles.*

A Tendon of the flexor pollicis longus, passing through the flexor pollicis brevis.

B Adductor pollicis.

C Abductor indicis.

DDDD Musculi lumbricales, lying in the interstices of the flexor tendons.

EEEE Tendons of the extensor digitorum sublimis, or perforatus.

FFF Tendons of the extensor digitorum profundus, or perforans, appearing through the flits of the perforatus.

GGG The mucous sheaths, containing the afore said tendons in the grooves of the finger bones.

### *Veins.*

a a a Branches forming the median vein.

b Branches forming the basilic vein.

*Nerves.*

## EXPLANATION OF THE TABLES.

### *Nerves.*

1 Ulnar nerve, which, after passing behind the annular ligament and palmar aponeurosis, is distributed to the little and ring fingers.

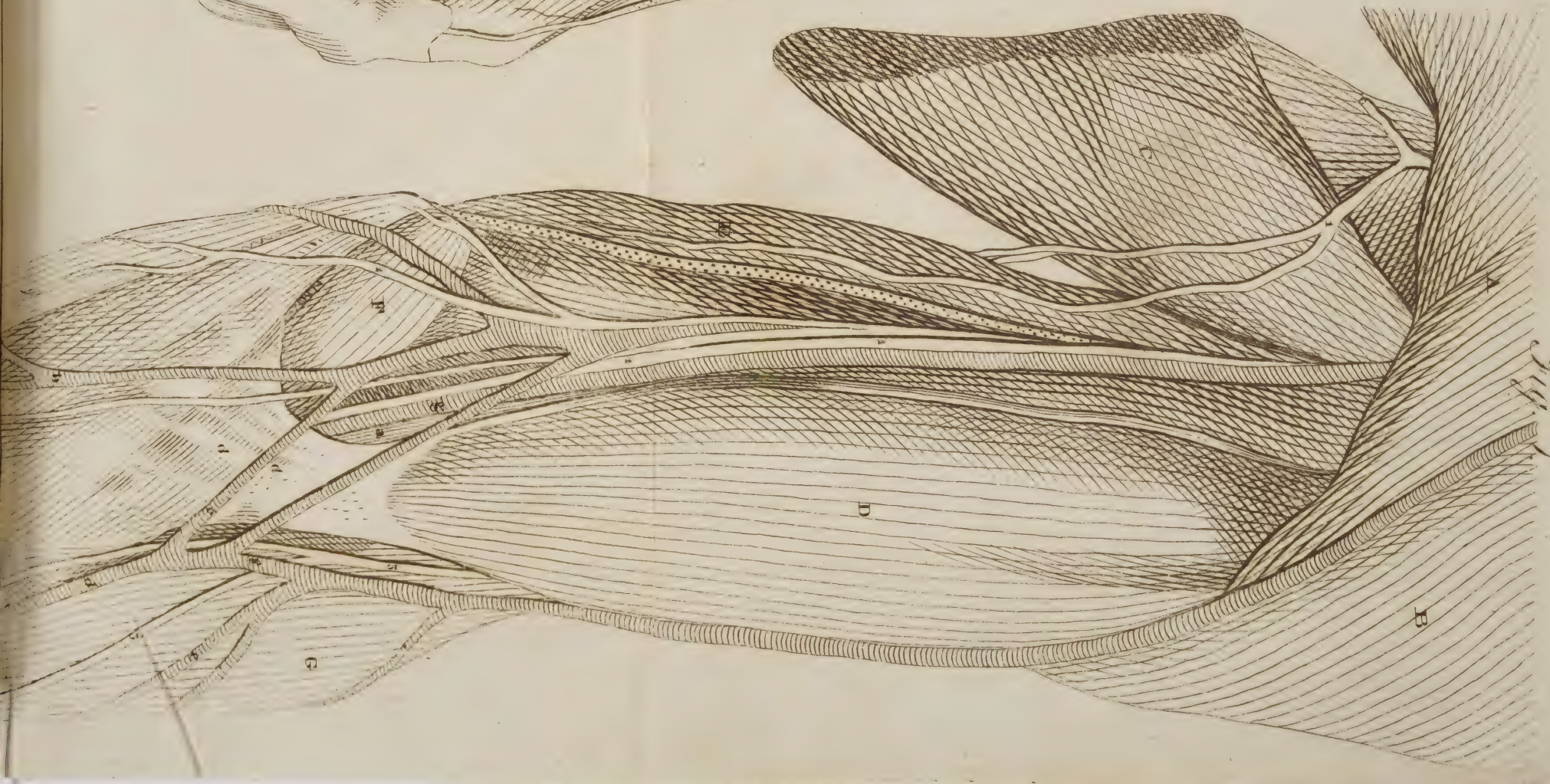
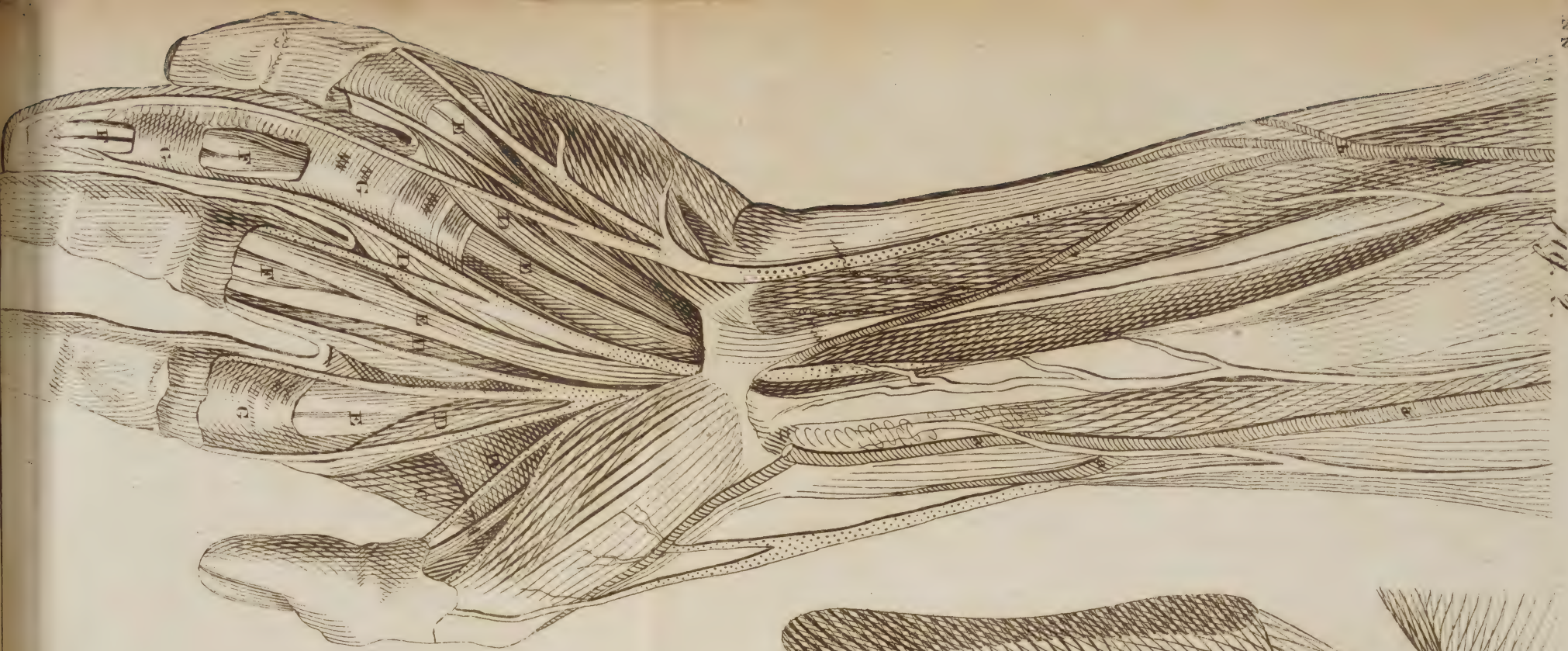
2 Radial nerve, that in the palm is divided into branches that go to the ring, middle, fore fingers, and thumb.

TABLE













## EXPLANATION OF THE TABLES.

### TABLE OO.

A View of the left superior Extremity, in a farther Progress of Dissection---by CAMPER.

#### FIG. I.

#### *Muscles.*

- A Pectoralis minor.
- B Coraco-brachialis.
- C Biceps, drawn a little aside, and the aponeurosis cut from its inferior tendon.
- D Brachialis internus.
- E Triceps extensor cubiti.

#### *Arteries and Vein.*

- a a Trunk of the axillary.
- b b b Trunk of the humeral artery, sending off the arteriæ reflexæ, or reflected branches.
- c Point of division of the brachial artery, behind the aponeurosis of the biceps, and on the inside of the tendon,
- d Radial, &c.
- e Ulnar branches,
- f Trunk of the axillary vein, lying lower and more superficial than the artery.
- g Cut trunks of the superficial veins.
- h h Cut trunks of the deep-seated veins that accompany the artery.
- i i Arteries and veins of the axillary glands.

#### *Nerves.*

## EXPLANATION OF THE TABLES.

### *Nerves.*

1 Part of the axillary or brachial plexus, from which the brachial nerves are derived.

2 Nervus scapularis.

3 Nervus articularis.

4 4 Nervus musculo-cutaneus, or perforans  
CASSERII.

5 5 Nervus muscularis.

6 6 Nervus radialis, which, near the flexure of the elbow, lies on the inside of the artery, and is also covered by the bicipital aponeurosis.

7 7 Nervus ulnaris, that passes behind the internal condyle of the os humeri to reach the fore-arm and hand.

### FIG. II.

### *Muscles.*

A Flexor carpi ulnaris.

B Palmaris longus.

C Flexor carpi radialis.

D Supinator radii longus.

E Palmaris brevis.

F Opponens pollicis.

G Flexor pollicis brevis.

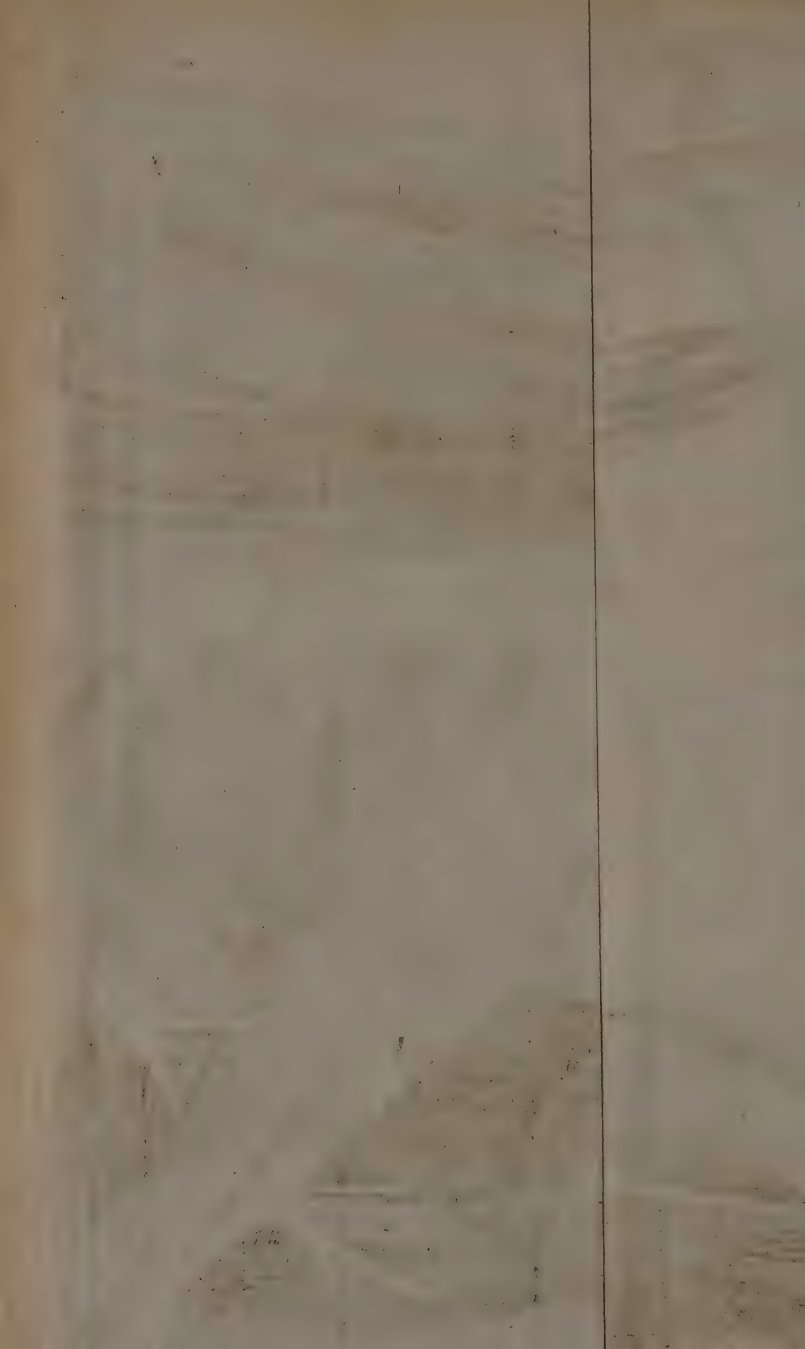
H Ligamentum carpi annulare anterius.

### *Arteries.*









## EXPLANATION OF THE PLATES.

### *Arteries.*

a a Ulnar artery.

b b Radial artery.

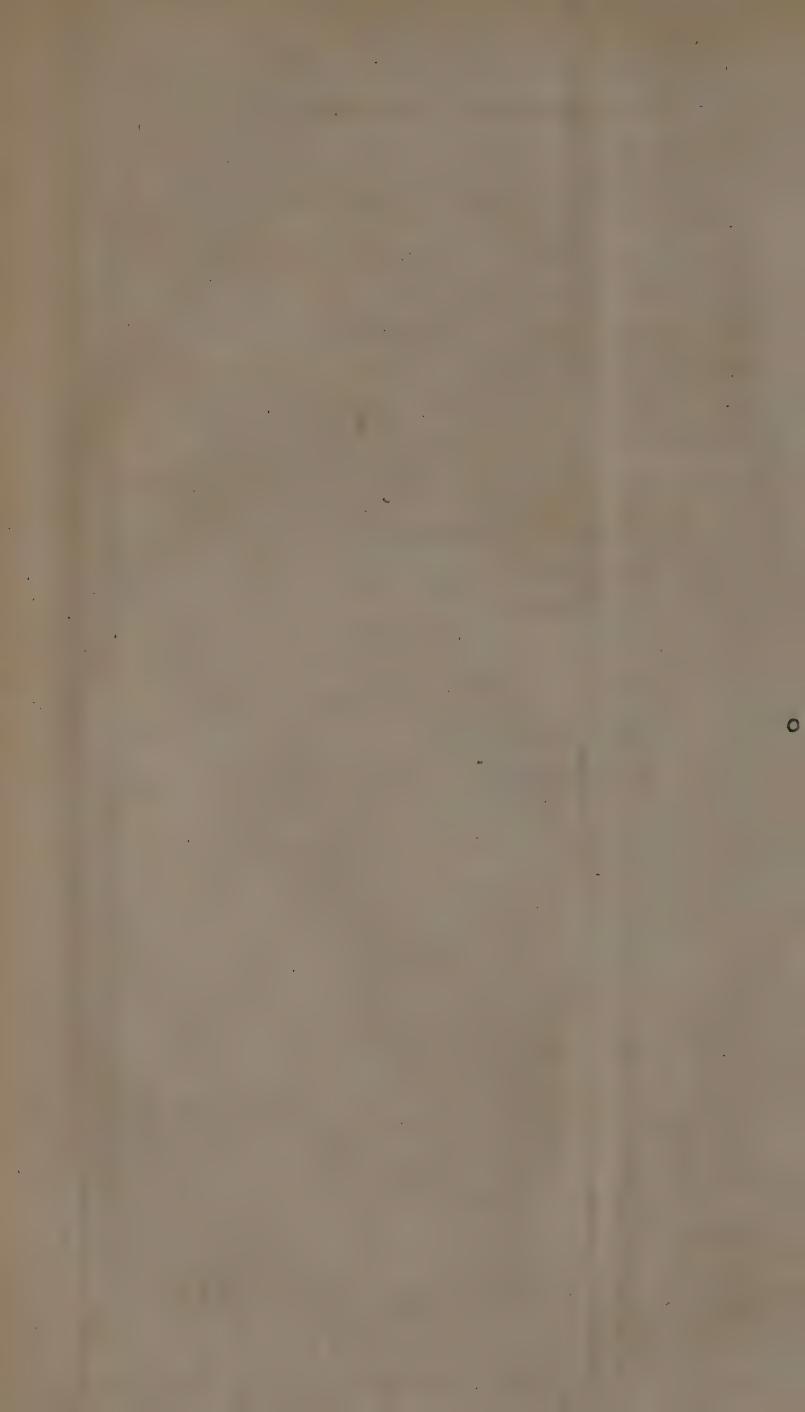
c c c Palmar arterial arch, formed by the radial and ulnar arteries.

d d d d d Branches arising from the palmar arch, running to the side of the little finger, and to the interstices of the others. The three middlemost, at the beginnings of the fingers, are each divided into two, and accompany the nerves along the sides of the sheaths of the tendons.

### *Nerves.*

1 1 1 Ulnar nerve.

2 2 2 Radial nerve.



## EXPLANATION OF THE TABLES

### TABLE PP.

#### FIG. I.

A View of a Dissection of the left Side of the Neck and corresponding Arm---by CAMPER.

#### *Muscles.*

A A Scalenus anticus.

B B Scalenus medius.

C Scalenus posticus.

D D Subscapularis.

E Teres minor.

F Teres major.

G Long tendon of the biceps, passing through the capsular cavity.

H Short tendon of the biceps, going to the coracoid process.

I Coraco-brachialis.

K K K Intercostales.

#### *Nerves.*

a a a a Portion of the left intercostal nerve.

b b b, &c. Axillary or brachial plexus, that sends branches to the arm.

c Scapularis.

d Perforans CASSERII.

e Muscularis.



## EXPLANATION OF THE TABLES.

### FIG. II.

A View of a Dissection of the Back of the Fore-arm and Hand.

A Tendons of the extensor communis digitorum.

B Ligamentum carpi annulare posterius.

CDE Extensors of the thumb.

F Extensor carpi ulnaris.

GG Extensors carpi radiales longior & brevior.

H Abductor indicis.

I Adductor pollicis.

KK Interossei appearing in the interstices of the extensor tendons.

### *Nerves.*

a Branch of the muscularis.

b Branch of the ulnaris.









## EXPLANATION OF THE TABLES.

### TABLE QQ.

#### FIG. I.

A View of a Section of the Pelvis---by CAMPER.

A A, &c. Last lumbar vertebra, os sacrum, and os coccygis, cut vertically.

B Left os pubis, cut from its fellow at the symphysis.

CC Crura of the corpora cavernosa penis.

D Glutæus maximus.

E Coccygæus, covering a part of the sacro-ischiatic ligaments.

FF Pyriformis.

G Levator ani.

H Obturator internus.

#### *Arteries and Veins.*

a Left common iliac artery.

b External iliac artery.

c Epigastric artery.

d Internal iliac artery.

e Obturator artery.

f Arteria glutæa.

g Arteria pudenda, or pudica communis, sweeping along to the arch of the pubes and corpora cavernosa penis.

h Common iliac vein.

i External iliac vein.

#### *Nerves.*

## EXPLANATION OF THE TABLES.

### *Nerves.*

- 1 Obturator or posterior crural.
- 2 2 Part of the sacral plexus, that sends off the ischiatic nerve.
- 3 3 Branches running to the penis, &c.

### FIG. II.

#### A View of the Perinaeal Parts---by CAMPER.

- A The anus.
- B B The penis.
- C C Glutæi muscles.
- D D Sphinctor ani.
- E E Levator ani.
- F F Erectores covering the crura of the corpora cavernosa.
- G G Transversalis perinaei.
- H H, &c. Ejaculatores covering the bulb of the urethra.

### *Artery, Vein, and Nerves.*

- a Arteria pudica.
- b Vena pudica.
- c c Nerves going to the penis.



Fig. 2.

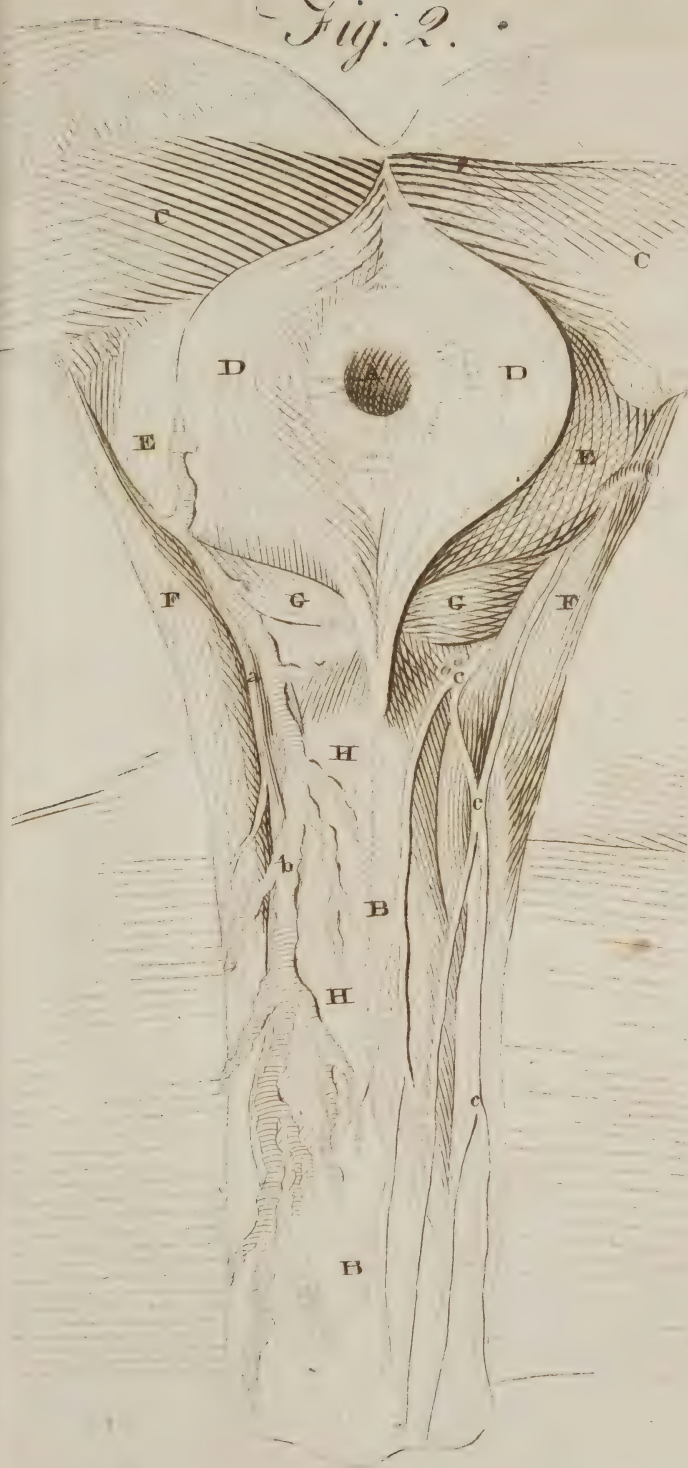
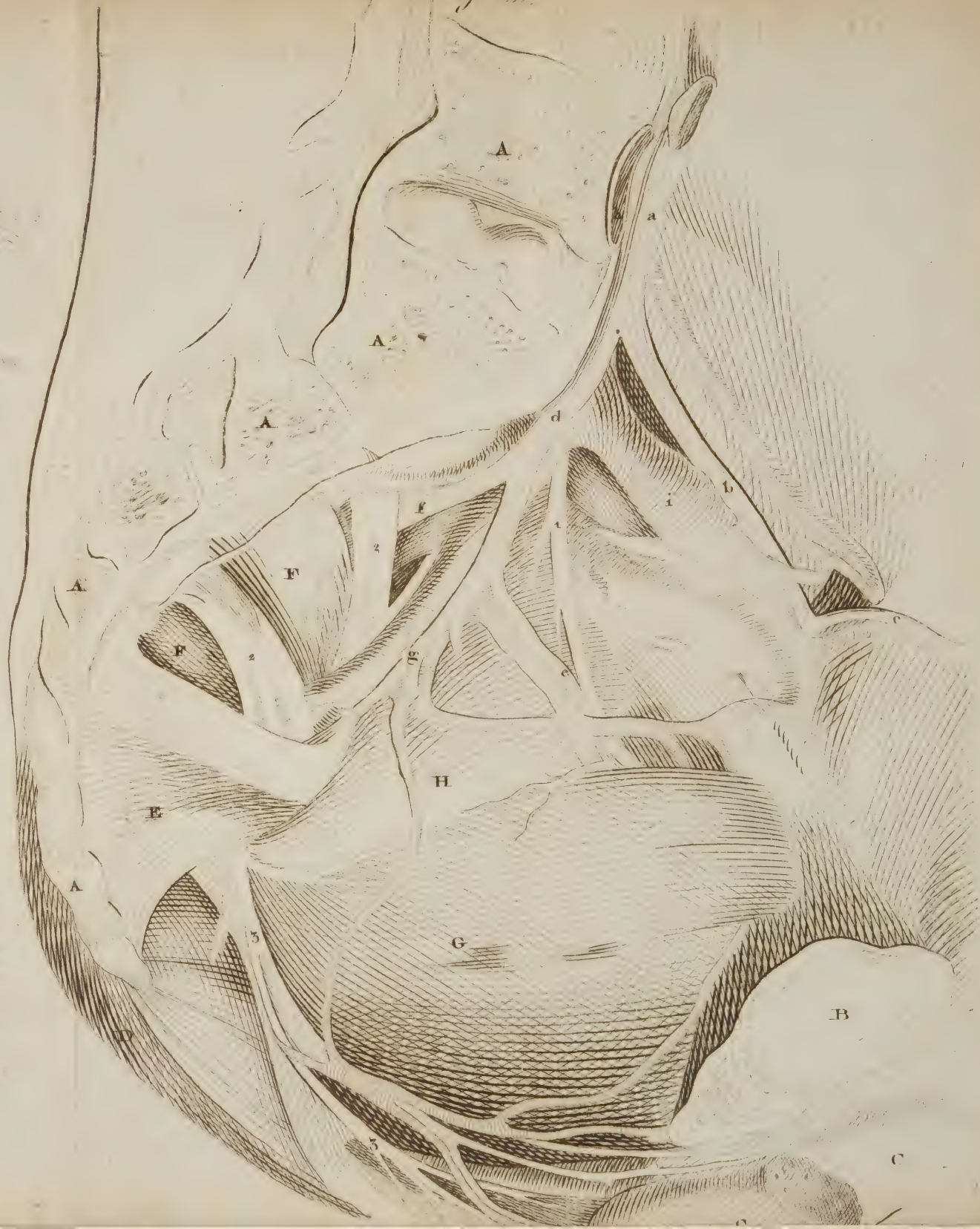
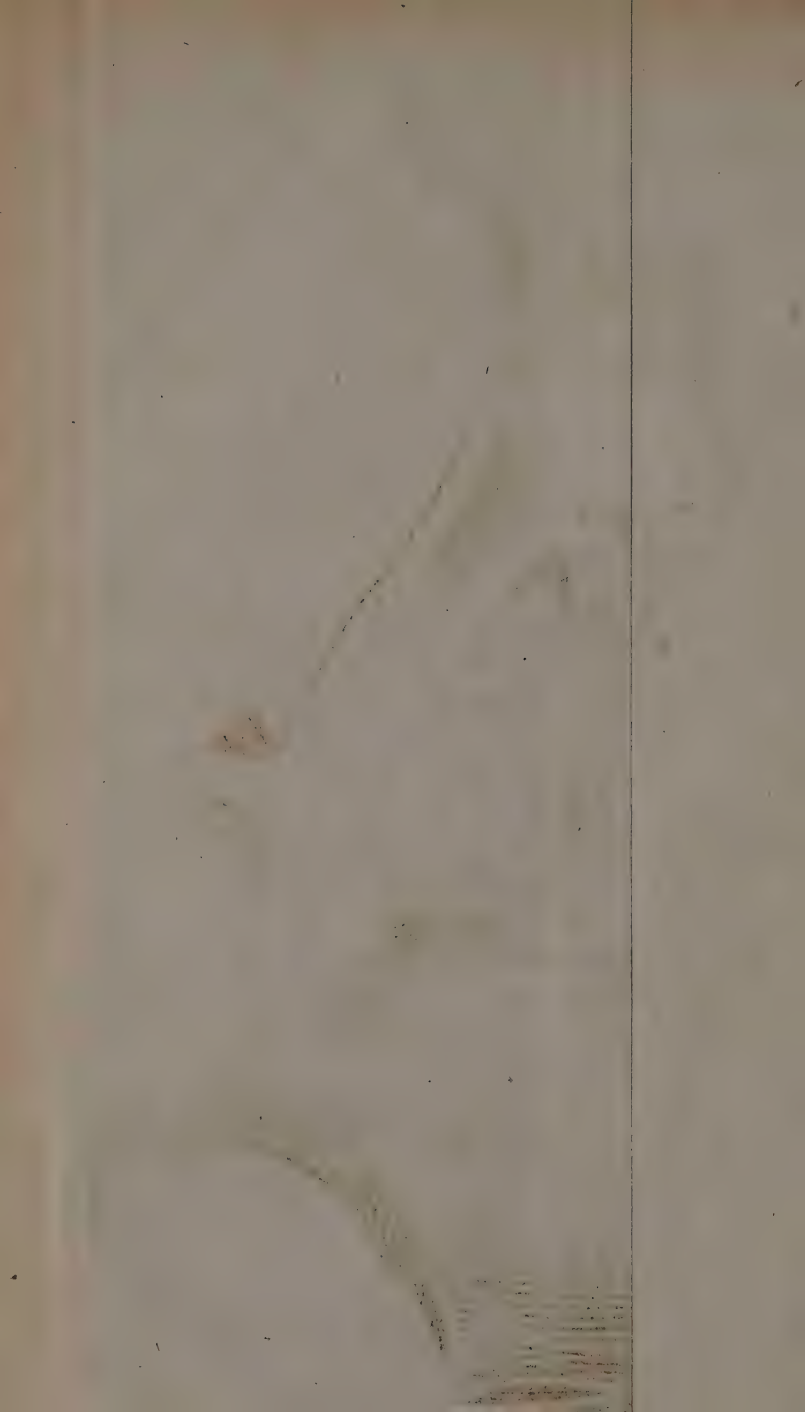


Fig. 1.





## EXPLANATION OF THE TABLES.

### TABLE R R.

#### FIG. I.

A View of a vertical Section of the Pelvis---  
by CAMPER.

A A Section of the os sacrum and coccygis.

B A section of the symphysis pubis.

a a a Inferior part of the intercostal nerve.

b Posterior crural or obturator nerve.

c Ischiatic nerve, formed by the sacral plexus, going out by the ischiatic notch above the sacro-ischiatic ligaments.

d Nerve running forward to the penis, &c.

#### FIG. II.

A View of a vertical Section of the Pelvis---  
by CAMPER.

A A Section of the os innominatum.

B A section of the symphysis pubis.

C Upper part of the rectum in the concavity formed by the os sacrum and os coccygis.

D The anus.

E Sphincter ani.

F Body of the bladder of urine, in a flaccid state.

G The ureter.

H Vas deferens.

I Vesicula seminalis.

K Prostate



## EXPLANATION OF THE TABLES.

K Prostate gland, partly covered by the levator ani,

L Membranous part of the urethra, lying under the arch of the pubes.

M A section of the crus of the right corpus cavernosum, cut off from the os pubis.

N A section of the same corpus cavernosum above the scrotum.

O A section of the left one.

P A section of the urethra.

### FIG. III.

A View of the Anus and Perinæum-----by  
CAMPER,

A The anus,

BB Levator ani.

C Prostate gland.

D Bulb of the urethra.

EE Crura of the corpora cavernosa, and the erectores.



Fig. 1.

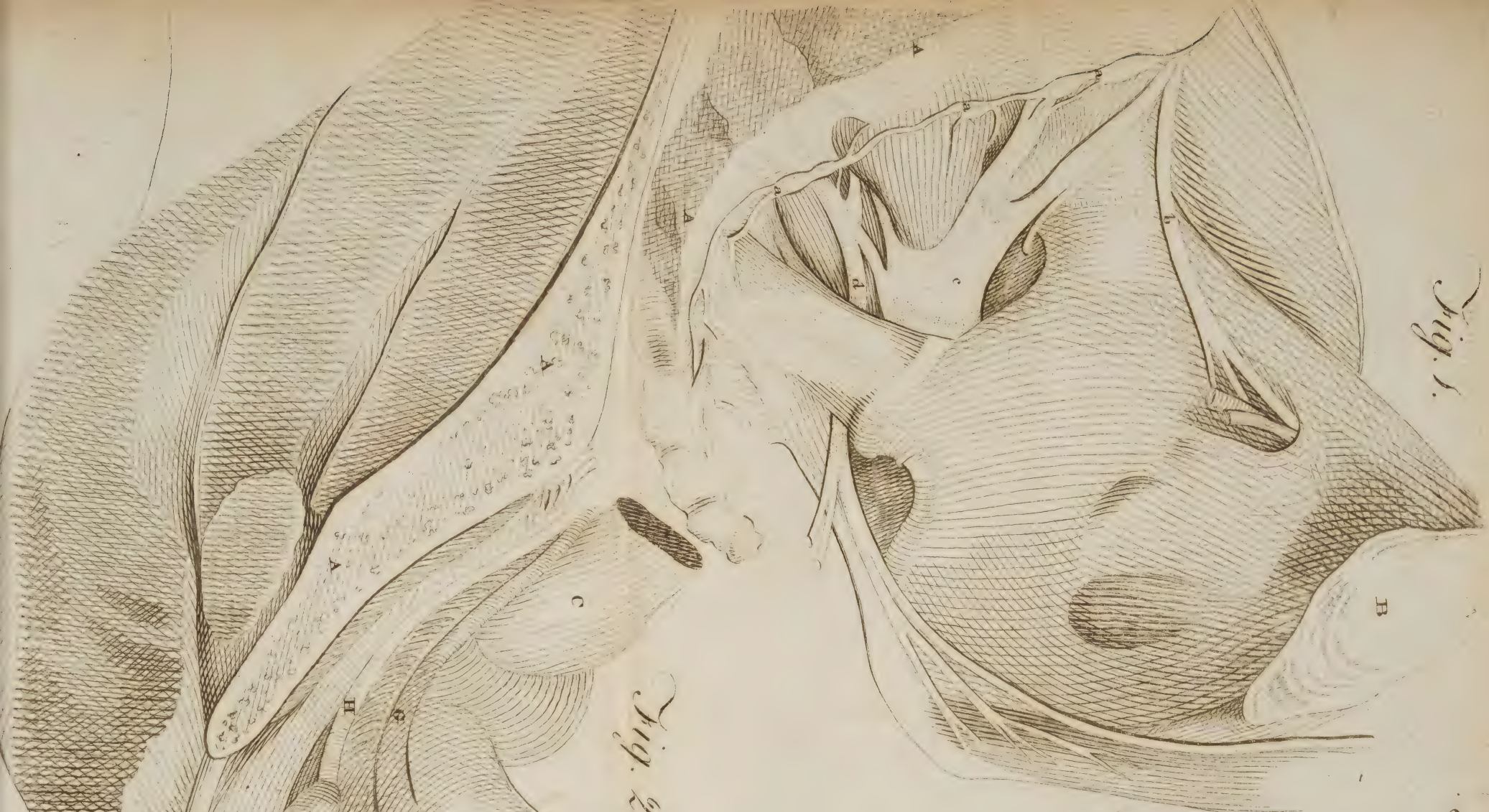


Fig. 2.







## EXPLANATION OF THE TABLES

### TABLE SS.

Three Views of the Spinal Marrow-----by  
HALLER.

#### FIG. I.

A View of the Spinal Marrow, covered by its  
Membranes.

A Upper point, by which it joins with the  
cauda of the medulla oblongata.

The forty pair of spinal nerves are seen  
going off on each side, also covered by their  
membranes.

#### FIG. II.

A View of the Spinal Marrow from which the  
Dura Mater is dissected off, and pinned  
back.

A Upper part of the spinal marrow.

B The termination of it in what is called  
cauda equina.

#### FIG. III.

A View of the Spinal Marrow, and the Man-  
ner in which it is supplied with Blood; the  
Spine being cut open laterally.

A Upper part of the spinal marrow.

B Under point, where the cauda equina  
begins.

S

D Trunk

## EXPLANATION OF THE TABLES.

**D** Trunk of the aorta.

**E E** Right carotid artery.

**F F** Right vertebral artery.

**G G** Descending aorta.

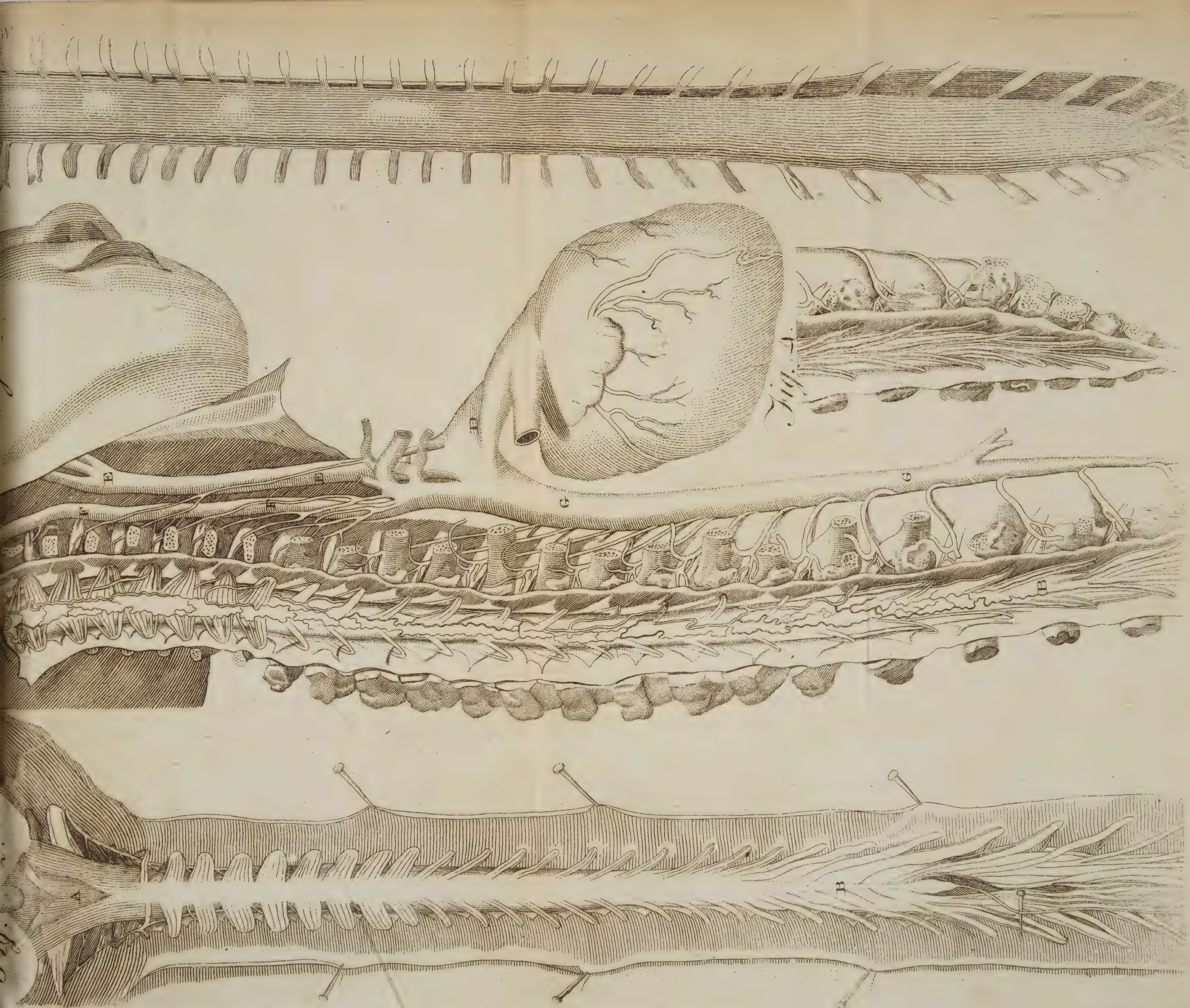
From these vessels branches are represented going off and entering the spinal canal, by its lateral holes, and beautifully dispersed on the spinal marrow, and anastomosing with branches from above.

### FIG. IV.

The inferior part of figure third.

**TABLE**











## EXPLANATION OF THE TABLES.

### TABLE T T.

#### A Dissection of the anterior Part of the Trunk ---by JENTY.

A Trachea arteria.

B B Sternum.

C Pectoralis major.

D The right mamma.

E E, &c. Cut extremities of the uppermost ribs of the left side.

F A part of the surface of the heart appearing through

G G The pericardium cut open.

H H Left lungs.

I Upper surface of the diaphragm.

K Umbilicus, to which the remains of the umbilical vessels and urachus are seen connected.

L L The liver, divided into right and left lobes by

M The suspensory ligament.

N The stomach.

O O The great omentum, through which the arch of the colon is apparent.

P P Convolutions of the intestines.

Q Q Peritonæum and abdominal muscles folded back.











## EXPLANATION OF THE TABLES.

### TABLE UU.

Two Views of the Abdominal Parts-----by  
HALLER.

#### FIG. I.

- A A The liver turned upwards.
- B Gall-bladder and biliary ducts.
- C The stomach.
- D Little omentum inflated.
- EE Arch of the colon inflated.
- FF Convolutions of the small intestine.

#### FIG. II.

- A A Liver turned upwards.
- B Small omentum inflated.
- CCC Great omentum inflated.
- DDD Convolutions of the small intestine.







Fig. 1.



Fig. 2.







## EXPLANATION OF THE TABLES.

### TABLE VV.

A View of the Liver, Stomach, &c. the former a little drawn upwards.

#### *The Liver.*

A Concave or under surface of the right or great lobe.

B A small part of its convexity, or upper surface.

C Concave or under surface of the left, or small lobe.

D A portion of the suspensory ligament, remaining in the notch, and sinking into its canal; the cord-like part of this was umbilical vein.

E The gall-bladder, partly lodged in a peculiar fossa in the great lobe.

F Cystic duct.

G G G G The sinus, or transverse scissure, common to both lobes, called sinus portarum.

H Hepatic duct emerging from the sinus portarum, and ending in the cystic one.

I The ductus communis choledochus, or cystic and hepatic ducts conjoined, running downwards to the duodenum.

K Trunk of the hepatic artery, a branch of the coeliac one dividing into two or three branches



## EXPLANATION OF THE TABLES.

branches, and, entering the liver by the sinus portarum.

L Trunk of the vena portarum, dividing and entering the sinus portarum, on its way from the intestines.

### *Stomach.*

a a a Small arch or curvature, corresponding to the spine.

b b b Great arch or curvature, inclining forwards.

c c Little omentum, occupying the small curvature.

d The point of the lobulus SPIGELLII, a small process of the liver, appearing through the little omentum.

e e e The coronary vessels, sweeping along the small arch, and sending off numerous branches.

f f f The coronary vessels, running on the great omentum, near the great curvature, and likewise sending off many branches that surround the stomach, and anastomose with the former.

g g g Upper part of the great omentum, depending from the stomach.

h Great or left extremity that lies in the left hypochondrium.

i Small or right extremity, that, together with the great lobe of the liver, occupy the right hypochondrium.

k Upper

## EXPLANATION OF THE TABLES.

k Upper or cardiac orifice, cut from the oesophagus, immediately below the diaphragm.

l The under or pyloric orifice, with a small portion of the duodenum surrounding it. The pylorus nearly fills it up.

m Edge of the spleen that lies between the great extremity of the stomach and the ribs.











## EXPLANATION OF THE TABLES

### TABLE W W.

A View of the Liver, Spleen, Pancreas, and Duodenum, from below, after the Stomach is removed, and the anterior edge of the Liver drawn a little upwards.

#### *The Liver.*

A Concavity of the great lobe.

B Convexity of the small lobe.

C Lobulus SPIGELLII.

D Notch in the posterior or thick edge, that corresponds to the spine.

EEE Sinus portarum, or scissure by which the vessels are transmitted.

F Gall bladder.

G Cystic duct.

H Hepatic duct arising from the sinus by two branches.

I Ductus communis choledochus.

K K K Hepatic artery, a branch of the coeliac.

L L L L Trunk of the vena portarum, entering the sinus in two branches.

#### *Spleen.*

AAA The concave surface that corresponds to the great extremity of the stomach, with its scissure or sinus. transmitting vessels.

The convex surface is turned to the diaphragm and ribs.

T 2

*Pancreas.*

## EXPLANATION OF THE TABLES.

### *Pancreas.*

AAA The great pancreas, and that surface which is seen from the omental cavity. The one end is attached to the spleen, and the other to the duodenum.

The dotted lines represent the excreting duct running longitudinally, and receiving numerous lateral branches, and enlarging as it approaches the duodenum, into which it opens, along with, or near to the biliary duct.

B The little pancreas; the dotted lines shew the manner and course of its duct.

### *Duodenum.*

A The pylorus, surrounded with a small share of the adjacent substance of the stomach.

B Upper part of the duodenum, covered by the liver when in situ.

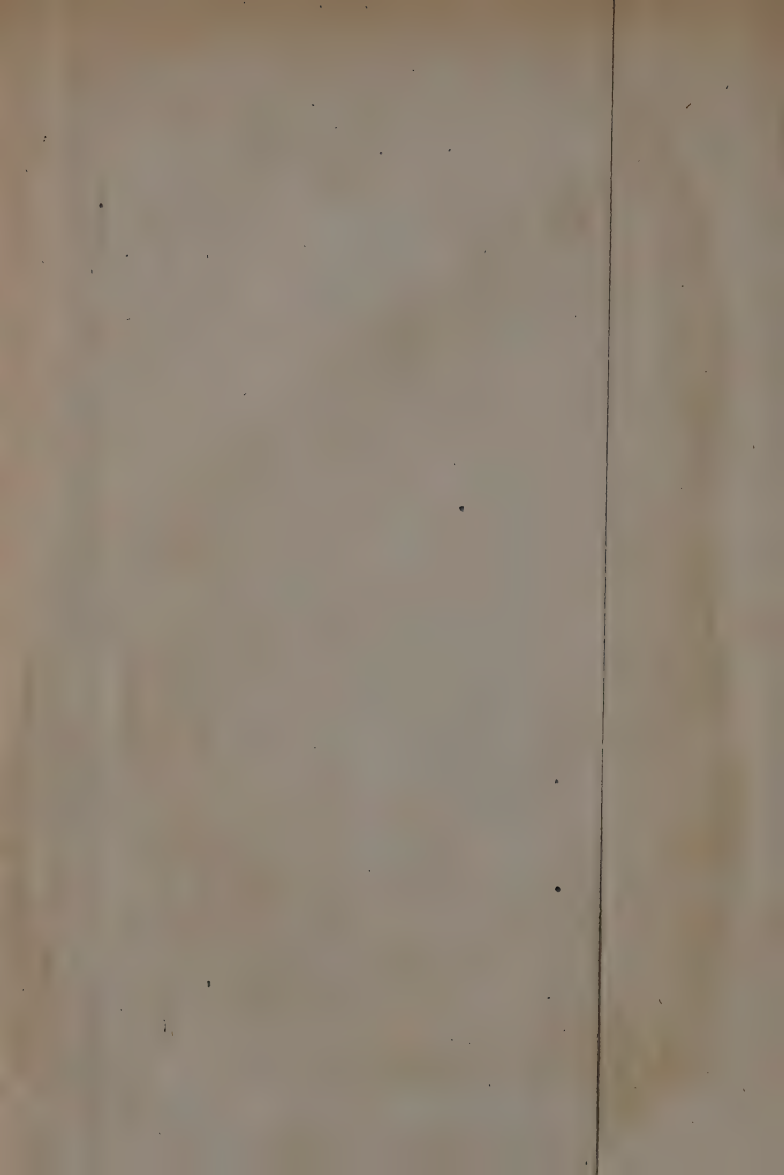
C The arch, or curvature, slit open to shew the valves or rugæ, and the common orifice of the biliary and pancreatic ducts.

D The duodenum, tending to the left side, across the spine, where it is concealed by the laminae of the mesocolon, as in a sheath.









## EXPLANATION OF THE TABLES.

### TABLE XX.

#### Various views of the Testicle.

##### FIG. I.

A The body of the testicle, covered by the tunica adnata or propria; the tunica vaginalis being entirely removed.

B Beginnings of the epididymis, sometimes called, caput epididymidis.

C The other extremity of the epididymis, where it is reflected upon itself, and goes on to produce

D The vas deferens, which joins

E The remainder of the spermatic cord.

##### FIG. II.

A The tunica adnata, drawn off from the body of the testis, still, however, adhering to its dorsum, where some of the delicate convoluted feminal vessels appear.

##### FIG. III.

The body of the testicle somewhat opened, after the tunica adnata is separated, to shew the manner in which the convoluted cones of feminal vessels lie, and tend to its dorsum.

##### FIG. IV.

The Testicle, so dissected as to shew the Manner in which the feminal Cones produce

A The vasa efferentia that constitute the caput epididyminis, and that, uniting into one tube,

## EXPLANATION OF THE TABLES.

tube, much convoluted, forms the rest of the epididymis, that ends in vas deferens.

### FIG. V.

A View of the Testicle and Spermatic Vessels, so opened and prepared as to shew, after the Body of the Testicle is opened,

A A The seminal convoluted ducts, tending to the dorsum of the testicle, to issue under the name of vasa efferentia, B, that form the epididymis, C C, and the vas deferens, at first much convoluted, D D D.

E E Numerous lymphatic vessels that arise in the body of the testicle, and pass beyond the epididymis, and ascend along the spermatic cord.

### FIG. VII.

A The vas deferens, separated from the rest of the vessels in the spermatic cord, which gradually becomes smaller.

B Termination of the epididymis.

C Beginning of the epididymis, formed by the vasa efferentia.

D Body of the testicle covered by the tunica adnata.

### FIG. VIII. and IX.

The Vesiculæ Seminales, with which the Vasa Deferentia are connected, immediately at their opening into the Urethra.









## EXPLANATION OF THE TABLES,

### TABLE D.

#### FIG. I.

The Uterine System--by HALLER.

- A A Ovaria, the left one enlarged.
- B B The Fallopian tubes distended.
- C C Fringed extremities of the tubes.
- D D Body of the uterus cut open.
- E E Uterine cavity.
- F Os internum.
- G G Ligamenta lata.
- H H Vagina cut open on its posterior side.
- I Urethra.
- K Clitoris.
- L L Nymphæ.
- M M Labia.

#### FIG. II.

A view of the Os Internum, and part of the Vagina.

- A The rima.
- B B Vagina.

#### FIG. III.

A view of the Os Externum.

- A A Labia.
- B Clitoris.
- C C Nymphæ.

EXPLANATION OF THE TABLES,

CC Nymphæ.

D Hymen of a femilunar form.

FIG. IV.

A view of the Os Externum.

AA Labia.

B Clitoris.

C Urethra.

DDD Hymen of a circular form.

FIG. V.

A view of the Os Externum,

AA Labia.

B Clitoris.

C Urethra.

D Hymen, large and femilunar.

TABLE

## EXPLANATION OF THE TABLES.

### TABLE 2 D.

#### FIG. I.

**A** View of the Uterus of a Woman who died 36 Hours after Parturition, with its Arteries filled with Wax--by Dr. WALTER, sen.

**AA** The uterine arteries stretching along the margins of the uterus, and mutually anastomosing by numerous branches beautifully serpentine.

**BB** Internal spermatic arteries, anastomosing largely with the uterine ones near the fundus uteri.

**CC** External spermatic arteries, or those that run along the ligamenta rotunda, anastomosing with the others.

#### FIG. II.

**A** View of the Uterus of a Woman that died 24 Hours after Parturition, with its Arteries and Veins filled with Wax, from which the Cellular Matter has been somewhat dissected--by Dr. WALTER, senior.

**AA** The arteries moderately filled beautifully intermixing with the veins.

**BB, &c.** The veins, comparatively large, and exceedingly numerous and serpentine, with branches corresponding to the spermatic arteries external and internal,













## EXPLANATION OF THE TABLES.

### TABLE DD.

#### FIG. I.

A view of the Uterus a few days gravid---by  
R U Y S C H.

AA The body of the uterus cut open, so that its thickness and part of its cavity are seen.

B The os internum, or transverse rimæ, between the protuberances, that from similarity have occasioned it to be called os tinæ.

CC The line to which the vagina adhered.

DD The ovaria, the left one cut open.

E A vesicle enlarged or impregnated, (ovum fœcundatum).

F Vesicles not enlarged (ovula non fœcundata).

G Blood-vessels running in the cellular or common texture.

H Prominences caused by the contained vesicles, or ova.

II The ligaments of the ovaria.

KK The Fallopian tubes, slit open near their fimbriated extremities.

LL Parts of the ligamenta lata uteri.

MM Parts of the ligamenta rotunda uteri.



## EXPLANATION OF THE TABLES.

### FIG. II.

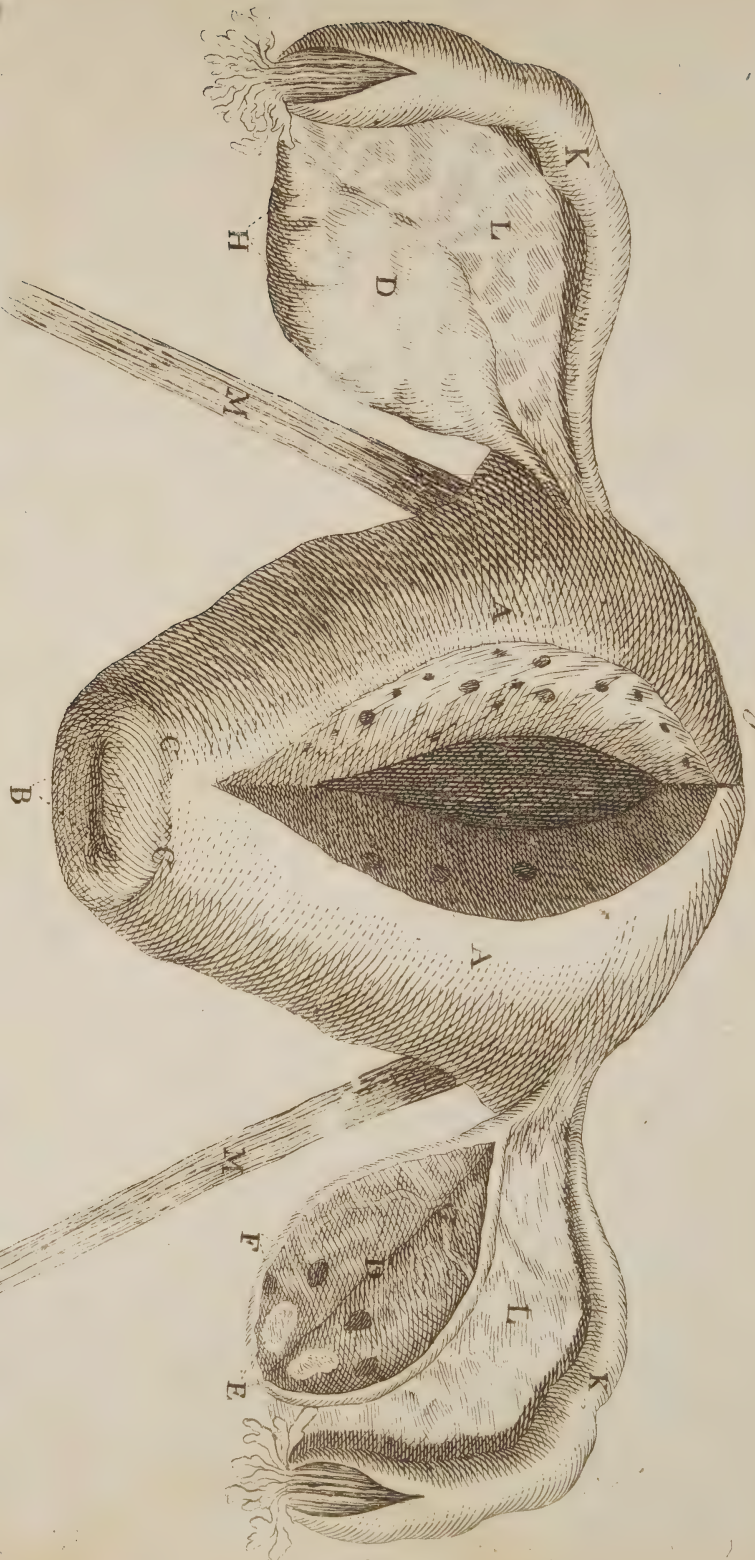
**A** view of a Uterus, taken from a woman who was killed a few hours after coition---- by RUYSCH.

The cavity of the uterus, and its tubes, were discovered filled with the male femenal fluid.

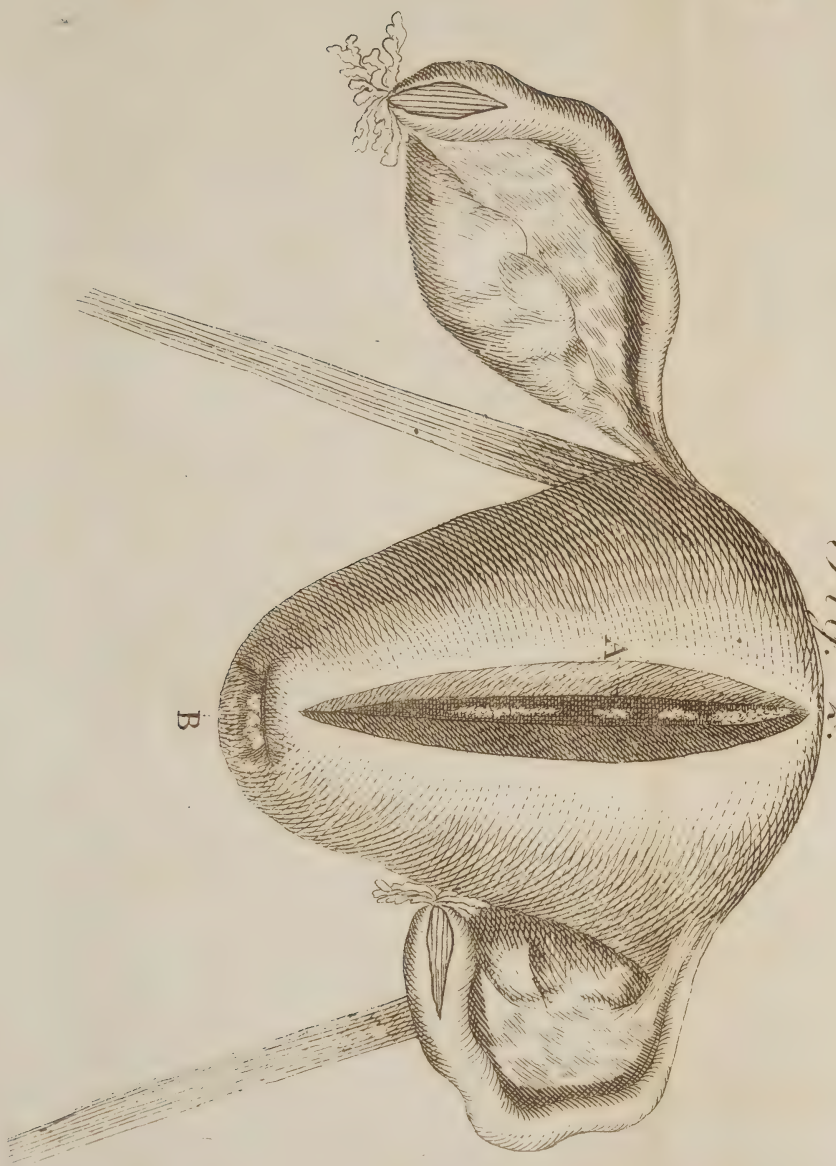
**A** The semen in the uterine cavity.

**B** The same matter appearing at the os internum.

TABLE



*Fig. 1.*



*Fig. 2.*



## EXPLANATION OF THE TABLES.

### TABLE DDD.

A view of the Uterine System, in consequence of a transverse and lateral section of the Pelvis---by SMELLIE.

A A The ovaria.

B B The Fallopian tubes ; the fimbriated extremity of the left one is applied to the corresponding ovarium, while that of the right one is turned forward to shew its orifice.

C The uterus, its fundus or bottom.

D Its corpus, or body,

E Its cervix, or contracted portion.

e e e e The space from which the cervix of the bladder has been cut off.

F The os internum.

The dotted lines shew the form, extent, and situation of the uterine cavity.

G G The ligamenta lata.

H H The ligamenta rotunda.

I I The vagina, cut open.

K K The superior part of the rectum.

L The inferior part.

M The last lumbar vertebra.

NN The ossa innominata at the place of dissection.

OO Cellular substance between the integuments and muscles.

P P The integuments of the nates.

Q The region of the os coccygis.





## EXPLANATION OF THE TABLES,

### TABLE-DDDD.

#### FIG. I.

**A** view of the Gravid Uterus, in situ, in the fourth or fifth month, cut vertically and transversely----by SMELLIE.

**AA** The ossa innominata cut as represented in the former plate.

**BBBB** The posterior segment of the uterus, containing numerous vessels.

**C** The foetus, with its vertex presented, or downwards.

**EE** Accidental flexions of the umbilical chord.

**F** The placenta, its concave surface covered by the chorion and amnios.

**GG** The membranes adhering to the uterus, from which the light waved lines, gggg, represent their edges as somewhat detached.

**H** The cervix uteri shortened, from which the bladder has been dissected.

**I** The os internum.

**K** The ligamenta lata.

**LL** The vagina cut open on the fore part.

**MM** Cellular substance.

**NN** The integuments of the nates.

**O** The anus.

## EXPLANATION OF THE TABLES.

### FIG. II.

A view of the gravid Uterus in the second month, cut vertically and transversely ; in which the Placenta and membranes are distinctly seen---by SMELLIE.

The cervix uteri is not shortened.

### FIG. III.

A view of the gravid Uterus in the second month, cut vertically and transversely.---  
The foetus and its parts are more evolved than in the former figure---by SMELLIE.

The cervix uteri is considerably shortened.



Fig. 1.



Fig. 2.

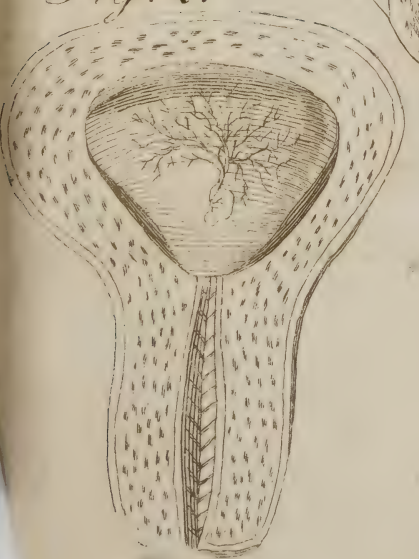
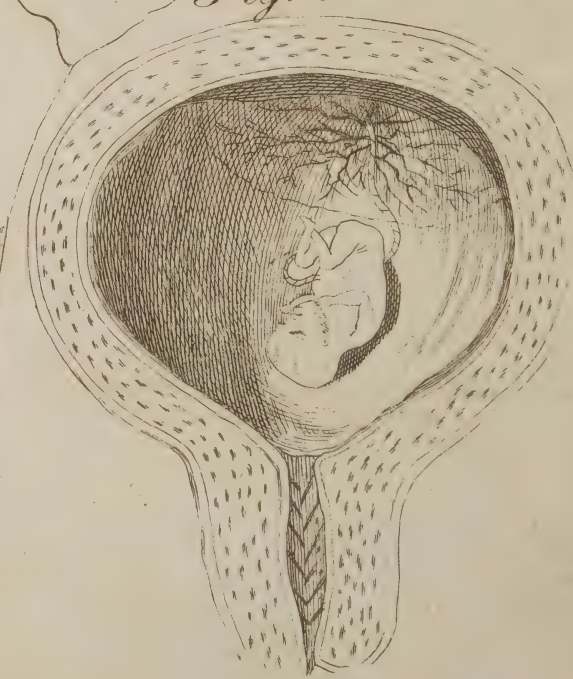
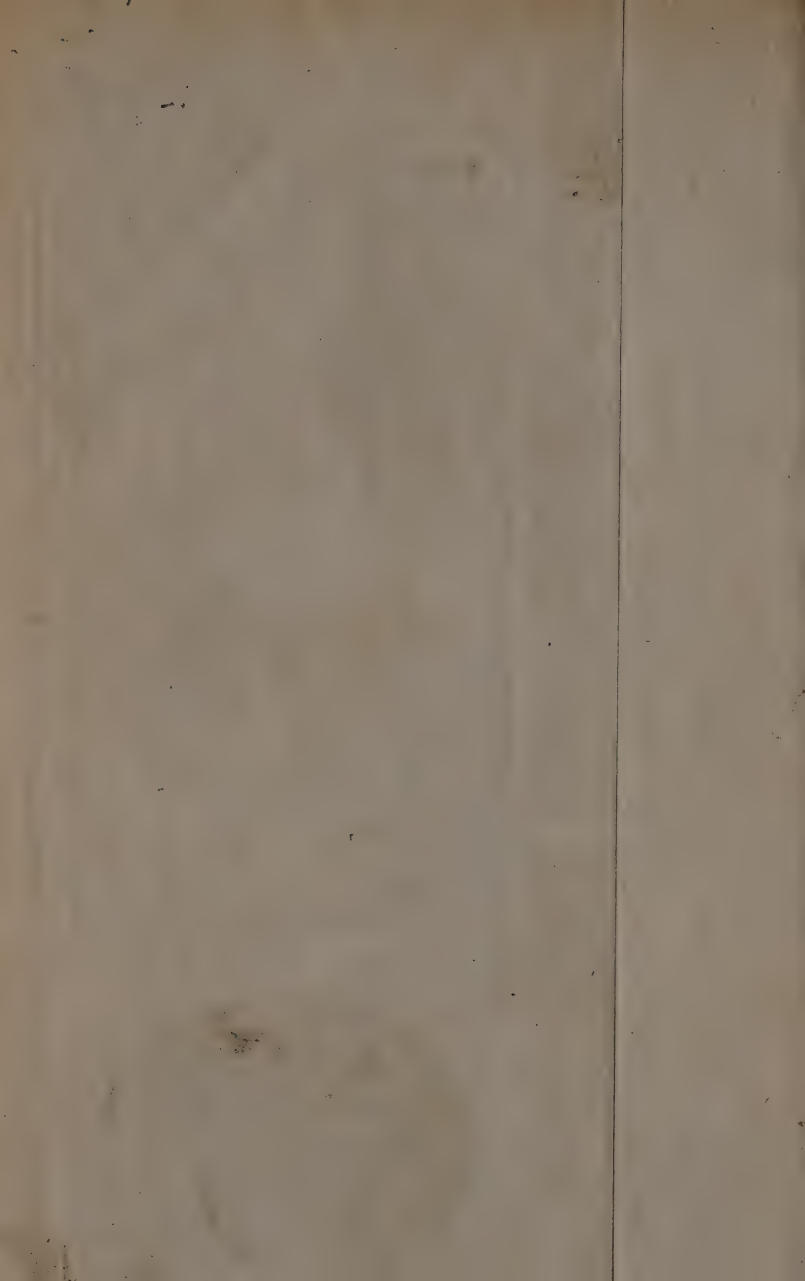


Fig. 3.







## EXPLANATION OF THE TABLES.

### TABLE FF.

#### FIG. I.

A View of the Vessels that form the Umbilical Chord, &c.---by BIDLOO.

A The umbilical ring or opening in the tendons of the abdominal muscles, about the middle of the linea alba.

B Part of the umbilical chord, drawn upwards, and tied by a thread to a nail.

C C The convex surface of the liver.

D D The intestines convoluted.

E The bladder of urine.

FF The internal iliac or hypogastric arteries, reflected on each side of the bladder, and running to the umbilical ring, to become umbilical arteries. They lie without the peritonæum.

G The umbilical vein, in its course from the umbilicus to the notch and canal of the liver, and to the sinus venæ portarum, from which the canalis venosus runs backwards to the vena cava. This is entirely without the peritonæum, and partly involved in the duplicature of it, which is called the broad or suspensory ligament of the liver, that divides the lobes.

H The

## EXPLANATION OF THE TABLES.

**H** The urachus, extended from the fundus of the bladder to the umbilicus, between the two arteries.

### FIG. II.

**A** View of the Heart of the Foetus, dissected so as to shew,

**A** The septum, or partition of the auricles.

**B** The foramen ovale, with its valve nearly filling it.

**F I N I S**

